Railway Age

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Keeping Railways in Pace with Industry

THE railways thus far this year have handled the largest freight business in history. The annual peak of the business has now been reached; but there are no shortages of cars. Throughout the year the traffic has been handled, and it is now being handled, more satisfactorily to the shipping public than ever before in any year of record-breaking business.

The course of developments has been such, however, as to give notice to both railways and shippers of the necessity of a continuance of constructive policies affecting freight transportation. The increase in traffic that has occurred is sufficient evidence that, whether traffic is or is not going to increase as fast in the future as it has in the past, it is still increasing fast enough to make necessary constant expansion of railway facilities.

Large Capital Expenditures Must Continue

What has occurred has partially obscured from the less observant, but has emphasized to the more observant, the need for a continuance of policies that will effect economies in operation. Even with allowance for the back mail pay that is being included in, and is giving a misleading impression regarding this year's earnings, the net return being earned is relatively the largest since 1916. This result is being attained, however, in spite of losses of passenger business, and increases of taxes and wages, and is due to an increase in freight business and especially to economies in operation due to the investment of capital. Apparently passenger business will continue to decline, while freight business will continue to grow. Apparently taxes will continue to increase, and there will be no cessation of demands for changes in wages and working conditions of employees tending to increase expenses—already the movement for a six-hour day is getting well under way. Obviously, therefore, billions of capital must continue to be invested in improvements if the railways are to continue to be able to handle freight traffic satisfactorily and at the same time secure reductions in costs of operation.

M. J. Gormley, chairman of the Car Service division of the American Railway Association, recently delivered a very constructive address before the Grain Dealers' National Association in which he pointed out what has been accomplished since 1920, and especially since 1923, by the policy of the railways in improving their properties and by the co-operation between them and the shipping public, and emphasized certain things railways and shippers should do in future to maintain service and at the same time keep down transportation costs and rates. Most of Mr. Gormley's address appears elsewhere in this issue.

Retirement of Inefficient Equipment

He urged a continuation of the "retirement of the smaller and less efficient equipment, both motive power and cars." Such a policy of retirement must, of course, be accompanied by one of installation of larger and more efficient equipment. The statistics bearing upon the matter indicate unusually large retirements within recent years as compared with the number of installations; but these statistics are somewhat misleading, because they include unusually large numbers of locomotives and freight cars that have been rebuilt, and therefore appear in both the retirement and installation figures. As a result of the retirements of old and installations of new equipment that actually have been made, the average tractive power of locomotives increased from 36,365 pounds in 1920 to 43,845 in 1928, and the average capacity of freight cars from 42.4 to 45.8 tons.

There can be no question as to the advantages that the railways have derived from the new and improved locomotives and cars that they have put in service; but there are still in use many thousands of freight cars that are not only of small capacity, but that in point of strength are inferior to most of the freight cars in service, and we constantly hear reports of old cars breaking down in long, heavy trains. It would appear that they make both maintenance of equipment and transportation expenses unnecessarily high, and that the savings in operating expenses that would result from their retirement would pay a very satisfactory return upon the investment required to replace them with new, larger and stronger cars.

It would appear that an even stronger argument can be made for the replacement of many of the locomotives still in service. Probably never during any other period of ten years has the steam locomotive been improved as much as it has been during the last ten years. Consequently, never in any equal period have so many

locomotives been made obsolete as means of producing the maximum practicable number of ton-miles of transportation per hour with the minimum practicable consumption of fuel.

The average speed of freight trains has been increased from about 10 miles an hour in 1920 to about 13 miles in 1929. The average number of cars per train has been increased from about 37 to almost 50. Fuel consumption per 1,000 gross ton-miles has been reduced from over 160 lb. to about 125 lb. What has been accomplished, however, is but a token of what can yet be accomplished by the acquisition of improved equipment, and by improvements in its utilization.

Heavier Loading of Cars

Mr. Gormley, in the address already mentioned, stressed one of the most important ways in which better utilization of equipment can be secured. This is, by heavier loading of cars—a policy which can be carried out only by co-operation between the railways and the shippers. As already pointed out, the average capacity of freight cars increased from 42.4 tons in 1920 to 45.8 in 1928. Meantime, the average load of all freight—including l.c.l.—actually declined. The average load of freight loaded in carload quantities increased from 34.5 tons to 35 tons. In other words, in 1920 the average capacity of freight cars exceeded the average loading of car-load freight by less than 8 tons, or 23 per cent, while in 1928 the difference was about 11 tons, or almost 33 per cent.

Now these figures do not show that the railways have derived no material advantage from increasing the capacity of cars. There have been changes in the character of freight traffic—the volume of light loading commodities carried having increased relatively more than the volume of heavy loading commodities—which largely account for the failure of the average car load to increase more; and probably if the average capacity of cars had not been increased the average load of carload freight actually would have declined.

Both railways and shippers can, however, derive great advantages from the heaviest practicable loading of cars; and it is certain that, generally speaking, cars are not being loaded as heavily as practicable, and that therefore all the possible advantages of this practice are not being gained.

The loading of cars to their maximum capacity, when it is commercially feasible, saves money for both the shipper and the railroad. It requires no more capital investment, and virtually no more operating expense, for a railway to haul 100,000 pounds in a car of 100,000 pounds capacity than to haul 50,000 pounds in it. This is but another way of saying that increasing the loading of cars is one way, and apparently the only way, in which, other things being equal, the amount of traffic handled by the railways can be increased without causing any appreciable increase in any of the costs of handling it. It means increasing earnings without increasing expenses—and, of course, that is the surest way to increase the prosperity of the railways and make possible reductions of rates—provided employees seeking higher wages or governments seeking more taxes, or both of them, do not, as they often have, forestall shippers seeking lower rates.

It is often answered, in response to urging that shippers load cars more heavily, that it is not commercially practicable; and in many instances this is the case. In his recent address, however, Mr. Gormley gave numerous specific examples of shippers and receivers of many kinds of freight having recently found it practicable largely to increase average loadings, to their own advantage as well as that of the railroads—the commodities mentioned by him including 29 kinds of foodstuffs handled by one manufacturer, flour, gray middlings, cement, corn meal, bulk salt, sugar, coal, aluminum ore, wheat, and so on.

Railways Should Educate Shippers

More progress would be made in increasing loadings per car if the traffic and operating officers of individual railways would carry on more educational work regarding this matter among their own shippers, especially in personal conferences with them. What is most needed, from a practical point of view, is not the putting of more "pressure" upon shippers, by increasing carload minimum weights or in other ways, but intensive educational work that will show them what they can do, how they can do it, and the advantages that will be gained by all concerned from heavier loading.

New forms of competition from other means of transportation, and the demands of American business for more and more speed in the rendering of every service essential or even incidental to the conduct of industry and commerce, make imperative continued and even accelerated progress in improving railway service and in increasing operating efficiency and economy. There are many things railway managements must do on their initiative to assure this progress; but there are many ways in which they must have the co-operation of their patrons, and also of regulating authorities, in order to assure it.

A Cost Accounting Problem

COST accounting is a process whereby direct expenses are assigned to the proper accounts, while indirect or common expenses are apportioned among these same accounts by some agreed-upon arbitrary basis. It is in the assignment of these indirect and common expenses that the principal difficulty with cost accounting arises. Commissioner Eastman, in his proposed report in the general accounting revision case, *Ex Parte 91*, specifically recognizes that the problem of the allocation or apportionment of expenses is important.

Paraphrasing the language of one witness in this case, the absence of definite and reasonably dependable

bases of apportionment might be compared to an attempt to erect a large building without a foundation, or undertaking a railroad journey from Chicago to Paris without first solving the problem of bridging the Atlantic. In other words, arriving at a reasonable basis for apportioning common expenses is the very first fundamental of any plan of cost accounting.

On page 35 of the proposed report, it is said that the proponent of the "Alternative Plan" was not able to advocate his proposed methods of allocation or apportionment of expenses to the various accounts "with entire confidence." On page 810 of the record, Mr. Roberts testified, under cross examination, that his bases of apportionment were not his recommendations but that they were put forward "for illustrative purposes only." On page 913 of the record, Mr. Roberts' counsel stated that it was not known whether these bases were "a proper basis or not." As indicated on pages 1062-1067, as well as pages 1073-1075 of the record, Mr. Roberts, under examination by his own counsel, undertook to advocate as his or the National Industrial League's recommendations these bases of apportionment. On page 1067, Mr. Roberts testified: "We have confidence in these bases." On page 1065, Commissioner Eastman stated that the witness was "prepared to recommend" these bases. On page 1063, counsel for the League said: "We expect to advocate these (bases of apportionment) unless something better is offered."

The statement in the Commissioner's proposed report that the bases were not advocated "with entire confidence" certainly expresses an evident truth. And yet the determination of adequate bases for the apportionment of common expense is the very first step, the *sine qua non*, of any system of cost accounting.

Small Engine Terminals Need Not Be Inefficient

NO better evidence is required that relatively small engine terminals need not be cramped in layout and half equipped, than that presented in an article appearing elsewhere in this issue, describing the new terminal of the Central Railroad of New Jersey near Bethlehem, Pa. While most roads appreciate this fact, there are still roads, which, while convinced of the economy to be derived from adequate facilities at large terminals, seem to lose sight of the economies possible through the use of equally modern facilities at smaller terminals.

A small terminal may require buildings and other structures of limited size and capacity, but this affords little excuse for antiquated design and inferior materials and equipment. The Bethlehem terminal cost in the neighborhood of $1,600,000, less than half the amount spent on a much larger terminal built by another road recently, but the smaller terminal is just as modern and thoroughly equipped to handle its work as the larger terminal.

The enginehouse at Bethlehem has only 16 stalls, but it incorporates all of the desirable features of modern design, materials and equipment, and is fitted to handle engine repairs as effectively as though it were twice or three times its size and had a correspondingly larger amount of work to handle. The coaling station has a storage capacity of only 300 tons, but is as up-to-date and efficient as any 2,000-ton station at a larger terminal. Similar comparisons could be made with respect to the power house, shop, ash pit and other facilities at Bethlehem. This terminal is an excellent example of the way in which small engine terminals can be made just as up-to-date and effective in proportion as the largest terminals.

Rail Orders Forecast Another Active Year

WITHIN the last month some sixteen of the larger railways have placed orders for more than a million tons of rails for their 1930 requirements. In other words, the mills already have on their books orders for considerably more than one-third of next year's needs. This condition is in marked contrast with the practice which prevailed a decade or two ago when few such orders were placed before spring. It indicates two things.

In the first place, it shows the growing tendency of the railways to order their track materials in the fall in order that they may secure deliveries in the early winter and get them installed in the tracks during the period when other maintenance of way work is at a low ebb. This practice is fostered by the practically universal improvement in maintenance standards in recent years which reduces the possibility of injury to new rail when it is carried for weeks or months without surfacing after being laid. It is also furthered by the growing appreciation of the fact that rail can be laid during the winter with little or no added cost for labor by utilizing the forces which must necessarily be retained to meet the emergencies that arise during the winter and the further fact that any constructive work such as rail laying that can be done during this season reduces the peak load of the summer by that amount.

The recent rail orders are also of interest by reason of the indication that they afford of the attitude of railway managements towards next year's improvement programs. The railways have spent freely for the improvement of their roadway during the last seven years and their tracks and structures are now in better shape than ever before. That the policy of still further improvement is to be continued during 1930 is indicated by the fact that the rail orders already placed exceed in tonnage those ordered by the same roads last year by three per cent. In other words, the number of roads which have already revealed the magnitude of their track improvement programs for next year is suffici-

ently large to afford a reasonably accurate basis for the statement that next year will be another active year for the roadway department and for the makers of roadway materials.

Experimenting With Passenger Service

SOME railroads have been experimenting, to a limited degree, with reduced rates for day coach travel. Tickets are sold, good only in day coaches and perhaps with other restrictions, between certain points at a rate somewhat lower than the standard 3.6 cents per mile for one-way trips and at a still lower rate for round-trip tickets. There is a certain danger in an experiment of this kind. The reduction might ultimately have some effect on through rates for long distance travel and it might bring some complications in the passenger tariff situation generally.

Granting a possibility of some danger in this regard, however, is not to condemn the experiment. It is natural for railroads which are still operating their passenger service at a profit, thanks to their volume of through traffic, to look askance at experiments of this kind. On the other hand, it is just as natural for railroads which have suffered heavy losses to be willing to go to considerable lengths with their experiments in the effort to find some solution for their problem.

A railroad executive has called our attention to the fact that, on his road, pass passengers now make up a very substantial percentage of all passengers carried. On this road revenue passengers carried have declined tremendously, but pass passengers not at all. The inference which this officer draws from his experience is that passengers who are carried for nothing, or almost nothing, are still not sufficiently "motor minded" to abandon low priced rail transportation.

This hypothesis being proved, in this instance at least, as far as pass passengers are concerned, would it not apply in modified form if low rates were made available to the public? In other words, is there not a field in railroad transportation in this country for second or third class service such as is provided in Europe? Such second or third class service to be really attractive would have to provide accommodations somewhat more comfortable than that now offered in some coaches at the full first class rate. Rates, no matter how low, could scarcely prove an attraction to persons traveling for pleasure if the accommodations offered at such rates were uncomfortable or unsanitary, such as day coaches in times past have frequently been.

There are many gradations of income and family expenditure in this country, but, generally speaking, there are only two varieties of railroad transportation offered—Pullman service which perhaps, all inclusive, costs about 4.5 cents a mile, and day coach service at 3.6 cents. Is there a sufficient spread between the charges for the two classes of service, in view of the difference in their quality and the expense of providing them? Assuming that Pullman service may make its appeal to families with incomes of, say, $5,000 or more a year, what quality of service is provided for families with incomes of $4,000 or $3,000 or $2,000? The automotive industry offers transportation of varying degrees of speed, safety and comfort in vehicles selling for from a few hundred dollars to thousands. The lowest priced automobile still has some appeal of comfort and beauty. Has the lowest priced railroad transportation a similar appeal? Indeed, is there any low priced railroad transportation offered regularly which is as great a bargain, when compared with Pullman transportation, as the low priced automobile offers when compared with the automobile selling for $2,000 and more?

We have asked a great many questions without attempting to answer them. Conclusive answers can be found only by actual experiment. Experiment may involve certain dangers, but are we not forced to accept these dangers, if we are to expect progress?

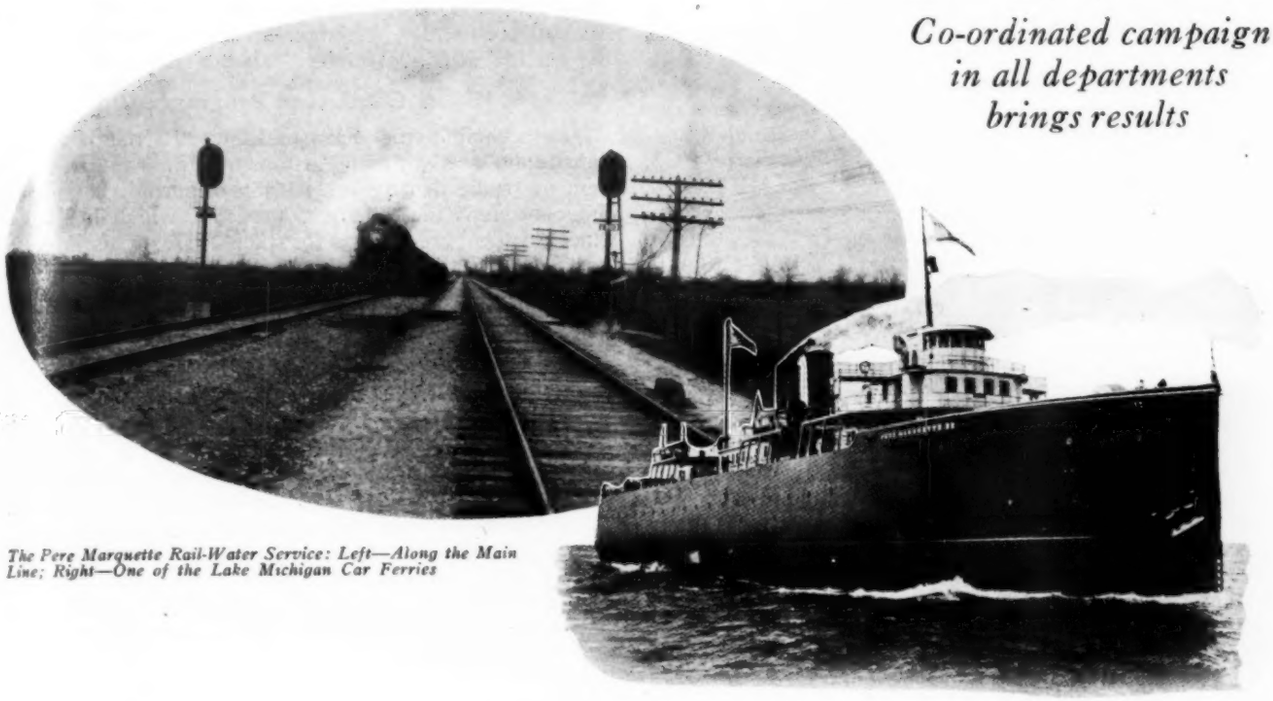
Train Control to Assist in Eliminating Rear-End Flagging

THE advantages of eliminating rear-end flagging as a means of reducing the number of collisions, as well as saving time, were discussed in an editorial in the last issue of the *Railway Age*, in which it was shown that certain modifications of Rule 99 were practicable because of the protection afforded by automatic block signals. Following the same line of thought, consideration may also well be given to the fact that one of the principal advantages of cab signals, as they are being installed in conjunction with automatic block signals on one large road, is the duplication of the indications in the locomotive cab to insure that the engineman will receive them regardless of weather, passing trains and other conditions that may interfere with his view of the wayside signals.

Likewise the purpose of automatic train control is to insure the proper control of a train in conformance with the indication of a signal indicating danger. Where auxiliary equipment is provided, additional protection is afforded by controlling the speed in the caution and occupied blocks. With automatic block signals providing rear-end protection, the necessity for rear-end flagging is obviated, and as a result short flagging is being countenanced. Therefore, flagging might well be eliminated as a means of reducing delays and preventing accidents. Surely where cab signals or train control are provided, it would seem logical to eliminate rear-end flagging.

Pere Marquette Shows Improvement

Co-ordinated campaign in all departments brings results



The Pere Marquette Rail-Water Service: Left—Along the Main Line; Right—One of the Lake Michigan Car Ferries

IN 1928, the net railway operating income of the Pere Marquette was $10,596,357. This represents an increase of $6,920,486 over 1918. Some of this is attributable to the growth of the automobile industry, as indicated by the fact that automobile shipments last year amounted to 706,192 tons, as compared with 138,602 tons in 1918. The major portion of the increase, however, is attributable to a closely supervised improvement program that involved every phase of railway operation. Unlimited funds were not available for this program, but, by watching every dollar that was spent, and securing a dollar's worth of benefit therefrom, it has been possible to make a remarkable improvement in facilities, in service and in operating methods.

Maintenance of way and maintenance of equipment programs were carried on simultaneously, and the consistent and continuing improvement of facilities and methods was paralleled by an adjustment of operations to meet changing conditions. A comprehensive development has taken place in yard operation, involving the building of new yards, and a complete change in classification methods. This plan also involved procuring a more efficient yarding plan at Chicago, by the rental of yards.

The P. M. has been successful in eliminating unprofitable branch line service. In some cases, the branches were abandoned and torn up, in others, unprofitable passenger service was eliminated.

At the same time, the car ferry service has been much improved as a whole. The operation of ferries across Lake Michigan has become an important factor, since it is possible to render excellent service from Wisconsin points and the St. Paul-Minneapolis gateway, via the ferries to Ludington, Mich., and rail beyond, as compared with the all-rail route around the south end of the lake through Chicago.

The improvement in operating factors in the last five years has been particularly noteworthy. An interesting comparison is afforded by the freight train miles and train hours respectively in 1928, as compared with 1923, the figures being as follows:

	1928	1923
Train miles	5,229,175	4,890,410
Train hours	406,773	535,160

These figures reflect the improved showing in train miles per train hour, which increased from 9.1 miles to 12.9 miles, an increase of 3.8 miles or 42 per cent; and in gross ton miles per train hour, which were 12,651 in 1923, and 19,865 in 1928, an increase of 7,214 miles or 57 per cent. Net ton miles per train hour increased from 6,175 in 1923, to 8,393 in 1928. Other interesting comparisons of operating factors are as follows:

	1923	1928
Cars per train	36.5	42.6
Net ton miles per car day	371	491
Car miles per car day	19.6	31.4
Pounds of coal per 1,000 g.t.m.	143	105

The lines now forming the Pere Marquette were built principally to serve the vast timber areas then existing in central and northern Michigan. After the timber was cut away, the territory served entered a transitional period, during which the development of agriculture and manufacturing took place. It was during this transitional period, accompanied as it was by a sharp and continued decrease in revenues, that the Pere Marquette was forced into receivership, from which it emerged in 1917.

The financial reorganization effected at that time was on an eminently sound basis, a fact which has aided in the development of the property. The consistent program of improvements in all departments of the railway, and particularly the operating department, has also achieved some notable results.

The character of the traffic handled has undergone a noticeable change since the road came out of receivership. The trend has been toward a marked increase in the volume of products of mines and manufactures, with a decrease in forest and agricultural products.

Automobile shipments, for example, amounted only to 138,602 tons in 1918. By 1923, this had risen to 457,972 tons, and in 1928, the total was 706,192 tons. This represents an increase of 567,590 tons, or 409 per cent in 10 years. The traffic in petroleum and other oils also shows a large increase, having been 296,183 tons in 1918, 558,229 tons in 1923 and 990,377 tons in 1928, an increase of 694,194 tons, or 234 per cent. Certain other manufactures showed decreases, but the trend generally has been upward, the total of manufactures handled having been 2,243,978 tons in 1918, 3,028,993 tons in 1923, and 4,418,260 tons in 1928, an increase of 2,174,282 tons, or 97 per cent.

Products of mines increased from 6,567,697 tons in 1918, to 9,737,931 tons in 1923, and 10,710,894 tons in 1928, this being accounted for largely by the increases shown by two items. Stone, sand and other like articles increased from 1,275,488 tons in 1918, to 3,809,198 tons in 1923, and 4,511,484 tons in 1928, while bituminous coal, which amounted to 4,286,807 tons in 1918, increased to 4,791,081 tons in 1923, and 5,168,453 tons in 1928.

Despite the increases shown in certain items such as flour and fruits and vegetables, the trend of traffic in products of agriculture has been steadily downward, having amounted to 2,010,419 tons in 1918, 1,864,089 in 1923, and 1,553,373 in 1928.

The density of traffic on the various lines, particularly the branch lines, has changed materially in the past 10 years. The management of the Pere Marquette has been alert in adapting new operating methods to meet these changes. By its forthright policy, the P. M. has managed to maintain friendly and co-operative relationships with the various state and civic bodies in the territory served. As a result, it has been successful in securing consent to eliminate regular passenger service on branches where the decline in traffic rendered such a step advisable.

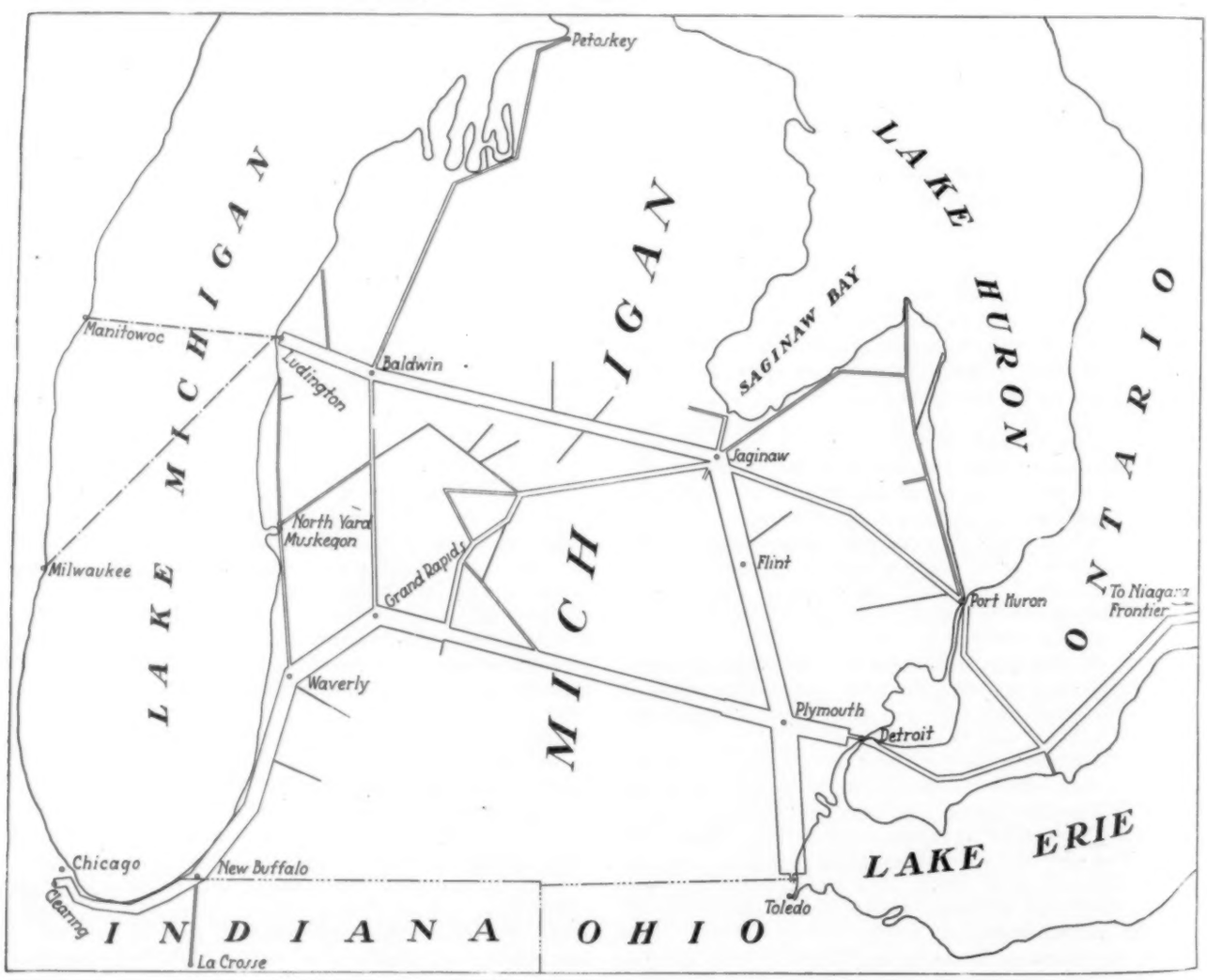
A Consistent Program

The accompanying diagram shows the relative traffic density on the various portions of the railway. The item of traffic density has had an important bearing on the consistent improvement program which has taken place on the Pere Marquette since 1917. This program has followed the plan of making additions and betterments where they were most needed, the determining factor being the traffic density.

The heavy traffic main lines have been or are being relaid throughout with 110-lb. rail. The depth of the ballast, which was formerly 8 in. to 12 in., has been increased to 12 in. to 18 in., and washed gravel is now used in place of bank-run gravel.

A continuing program of bank widening has been carried on in connection with the improvement in ballast. Passing sidings have been extended wherever necessary and a second track has been built between Plymouth, Mich., and Detroit.

In addition, two experimental sections of track, totalling 1700 ft. in length, have been laid on concrete slabs,



Improvements Have Been Governed by Traffic Density

the tests and results on the first section of which have been covered in previous issues of the *Railway Age*.

The signaling program has involved the installation, since 1917, of 225 miles of automatic block signals between Detroit and Chicago, and between Toledo and Saginaw, bringing the total to 350 miles. Centralized control has been installed between Bridgeport, Mich., and Mount Morris, 20 miles. This has materially increased the capacity of this single track line between two stretches of double track. Ten new interlocking plants have been built and a number of the old plants have been rebuilt or enlarged.

Maintenance of Equipment

The maintenance of way program has been paralleled by a construction program to provide adequate facilities for the maintenance of equipment. Several new shops have been built, and the Wyoming shops at Grand Rapids were completely rebuilt five years ago. New enginehouses have also been built at various places and several old ones have been rebuilt and brought up to modern standards.

That the program of maintenance of equipment has been successful is indicated by the savings in fuel costs. During 1928, 38 more passenger car miles were handled per ton of coal than in 1923, an increase of 13 per cent.

The improvement in freight service is indicated by the fact that 105 lb. of coal were used per 1,000 gross ton miles in 1928, as compared with 143 lb. in 1923, a saving of 38 lb., or 26.5 per cent, despite the materially increased speed of freight trains in 1928.

Switch engines now perform much more work per engine hour than heretofore. Despite this, 13.5 per cent more switching miles per ton of coal are now being obtained than in 1923.

The effect of these expenditures upon the operating ratio, once the new facilities were in service and producing the economies intended, is indicated by the maintenance of way and structures ratio, which was 12.94 in 1923, as compared with 10.73 in 1928, the maintenance of equipment ratio of 16.76 in 1923, and 19.95 in 1928, and the transportation ratio of 37.75 in 1923 and 32.60 in 1928.

New Equipment

At the end of 1920, the Pere Marquette had 448 locomotives with a total tractive power of 14,929,070 lb., or an average tractive power of 33,324 lb. Between 1920 and the end of 1928, 72 locomotives were retired and 42 new ones purchased. The latter consisted of 12 engines of the Pacific type, 10 Mikados and 20 heavy switch engines. This brought the total number of locomotives down to 418 at the close of 1928, but the total tractive power had been increased 3½ per cent and the average tractive power 11 per cent.

At the end of 1920, the P. M. owned 17,720 freight cars, having a total capacity of 649,314 tons. By the end of 1928, there had been a slight reduction in the number of cars, which was 17,428; but the total capacity had become 700,033 tons, an increase of 7 per cent. Purchases to date in 1929 comprise 400 steel gondolas, 1,000 new automobile cars and 100 Roger ballast cars.

Car Ferries

An important feature of the operations of the Pere Marquette is the car-ferry service across Lake Michigan. Two such lines are operated, one between Ludington, Mich., and Manitowoc, Wis., 61 miles, the other between Ludington and Milwaukee, Wis., 97 miles.

In 1917, five boats were assigned to these two lines. Two new boats have since been added, making a total

Much New Equipment Has Been Purchased

of seven car ferries in operation, with capacities of from 28 to 30 cars each. Two new boats, having capacities of 32 cars, are now being built and will be placed in service this year.

The car ferries handle an average of 402 cars a day, consisting of 260 loads and 142 empties. An interesting traffic, which has grown rapidly in the past few years, is the handling of tourists' automobiles across the lake. This service was begun through popular demand and it has become quite a source of revenue in the past few years.

The car-ferry schedule has been improved materially. Boats now make the run between Milwaukee to Ludington in just under eight hours, and between Manitowoc and Ludington in five hours. The yards at Ludington have been considerably enlarged, to take care of the increasing traffic moving via the car ferries and to permit prompter interchange between boat and rail.

To match the improved ferry schedules, the running time between Ludington and Detroit and Ludington and the Niagara Frontier has been reduced so that the through ferry-rail schedules are now much faster than they were formerly.

Operating Improvements

One of the most acute problems that the operating department was called upon to face in 1917, was the lack of adequate classification facilities. With prospects for a steadily increasing volume of business, the problem assumed added importance. The situation was studied carefully and the necessary steps were taken to rectify the difficulties.

A new yard, of the semi-hump type, was built at Ottawa, just north of Toledo, Ohio. This yard contains 46 tracks, exclusive of running tracks, and has a capacity of 3,344 cars. It will be observed from the traffic density chart that the line between Toledo and Plymouth, Mich., is the busiest portion of the railway. Ottawa yard takes care of the classification of this heavy traffic, received from and delivered to connections at Toledo.

The city of Flint, Mich., was assuming increasing importance as a manufacturing center, and two important steps were taken to relieve the congestion in this city and to render efficient operation possible. An additional classification yard was built at McGrew, Mich., just north of Flint, containing 25 tracks, with a capacity of 576 cars. In this yard, operations are much facilitated by a natural slope of the ground in the direction of classification.

A new line, eight miles long, was also built around the

city. The old line traverses the heart of the business and industrial districts, the growth of which was hampering operations. The new line serves another purpose in that it has afforded sites for a new industrial development. All through freight trains are now run via this belt line, so that the former main line affords greater facilities for the large number of switch engines operated in the Flint terminal.

Getting traffic through the Chicago terminal also presented problems. In order to facilitate the movement, the P. M. built a new flat yard at New Buffalo, Mich., with 19 tracks and a capacity of 1,455 cars. In addition, an interest was acquired in the Belt Railway of Chicago, giving the P. M. joint use, with the other owning roads, of Clearing yard on that line. The P. M. also leased a portion of the Rockwell yard of the Belt Railway, for its own use. By these means, the problem of Chicago interchange was solved, and efficient operation made possible. The yards at Grand Rapids, Mich., and Saginaw were also enlarged to meet the growing needs of those communities.

Changes in Operating Methods

As a result of the greater efficiency of operation made possible by these improvements in classification facilities, it was possible to schedule all symbol freight trains, and, what is more important, to keep them on time in accordance with the schedules. In all, 42 such symbol trains are run. This not only gives the yardmasters more opportunity to plan their work in advance, but also avoids a great deal of intermediate yarding. This has also permitted better handling in the Chicago district. About 75 per cent of the westbound business is now moved directly into Clearing yard, only one train per day going to Rockwell yard.

Business delivered to the P. M. at Toledo for the Detroit district is classified at Ottawa yard. The cars are arranged in the trains in the order in which they are to be set off in the Detroit terminal, and are set off by the road train, thus eliminating a number of needless switching moves.

An interesting experiment has proved successful on the P. M., in the operation of trains between Detroit and Grand Rapids, doing way freight work at night. In addition to local freight, these trains carry local passengers, express and parcel post. The westbound train leaves Detroit at 4:50 p. m., arriving in Grand Rapids at 1:20 a. m. The eastbound train leaves Grand Rapids at 5:45 p. m., arriving in Detroit at 2:10 a. m.

The regular crews on these trains are augmented by two freight handlers, and specially equipped lights are supplied. The agents at way stations have the merchandise on trucks ready for loading, the billing being kept in a special place. The train crews have keys for the freighthouses and the operation proceeds as though it were daytime.

The rapid increase in the tonnage handled by these trains is indicative of their popularity with the shippers and receivers. Numerous instances have been reported to the P. M. of receivers at stations 100 miles or more from Detroit ordering a freight shipment by telephone in the afternoon and having it delivered to them early the following morning. Another advantage of the service is that it avoids blocking grade crossings while unloading at many places, during the hours of the day when the highway traffic is heaviest.

Transportation Methods

The improved showing in average miles per car per day has been accomplished by co-ordinated effort on the part of the transportation department and the employees. The showing in this regard is kept constantly before the employees responsible for car-mile production. Various devices are used in this regard. At present, dials are posted at strategic points throughout the railroad. These dials have three arrows mounted on their faces, one showing the average car miles for the week, another the cumulative monthly average and the third, the highest week of the year. It is planned to replace these dials with thermometers in the next few months, showing the same information in different form.

Goals are set for expected performance and every effort is made to attain or surpass the expected figures. Even at best, the P. M. is a per diem debit road, and it is exceedingly important that a careful check be kept on car movement. The agents notify the superintendent of transportation promptly, as soon as a foreign car is received for unloading, and a home route is obtained on the car while it is being unloaded, so that it is ready for movement home as soon as the unloading is completed.

Car distribution on each division is handled by car distributors reporting directly to the superintendent of transportation. These men provide what might be called a neutral agency of car distribution, so that the work can be handled on a system plan, rather than on a divisional basis.

The success attending car handling is indicated by the fact that, in 1928, the P. M. had an average of 5,355 fewer cars on the line per day than in 1923, while handling an increase of 11.4 per cent in loaded cars.

Every effort is made to procure loads for foreign cars in the direction of home. There are, of course, a large number of cars on which this is not possible. In returning cars empty, every effort is made to use the

Mechanical Facilities Have Been Greatly Improved

shortest route possible under the rules. A campaign of education has been conducted which has been showing excellent results, as indicated in the accompanying table showing the number of cars short-routed and the mileage

Short Routing Results

	1929		1928		1927		1926	
	No. Cars	Miles	No. Cars	Miles	No. Cars	Miles	No. Cars	Miles
January	184	40298	101	18958	118	22695	72	14172
February	190	41736	78	14426	116	23373	48	8928
March	281	55242	119	23234	183	33230	63	12895
April	349	80658	175	29977	152	26447	96	19931
May	...	.....	135	25491	188	31794	223	42577
June	...	.....	206	37668	205	39017	187	39408
July	...	.....	158	25665	163	28122	150	22354
August	...	.....	163	31840	149	29798	109	18425
September	...	.....	240	44135	97	18674	106	17237
October	...	.....	162	32279	114	19851	78	14111
November	...	.....	238	45945	154	27274	110	20345
December	...	.....	257	53119	172	35637	139	31438
Total	...	.....	2032	382737	1811	335912	1381	261821

saved. It will be observed that, in April, 1926, for example, 96 cars were short-routed, saving 19,931 miles, as compared with 349 cars short-routed in April, 1929, with a saving in mileage of 80,658.

An excellent spirit prevails on the P. M. as between the officers and the employees. Much of this is the result of the high type of officers selected, and their ability to become thoroughly acquainted with all parts of the railroad. The president was also the general manager, and thus maintained an unusually intimate contact with the men.

The general superintendent has a service record of 29 years with the Pere Marquette, the assistant general superintendent has been with that railway for 32 years. The four superintendents have service records of 45, 20, 20 and 15 years with the P. M. These men started with the P. M. in the ranks, so that they are all familiar with the problems encountered by the employees from actual personal experience. This is a fair example of the conditions existing in all departments.

The development of esprit de corps under these circumstances has been most successful, and is responsible, to a considerable degree, for the success attending the operations of the Pere Marquette.

Southern's Employees Provide for Pensions and Insurance

EMPLOYEES of the Southern Railway System have voted to establish a system of pensions or annuities for individuals retiring at 65 or 70 years, and also a system of health and accident insurance. For this purpose they have formed the Southern Railway System Employees' Pension Association, the headquarters of which will be at Chattanooga, Tenn. The chairman of the executive committee is J. B. Mahoney and the Secretary Z. H. Deem. The business operations of the pension insurance plans are to be carried on under the direction of A. H. Plant, Washington, D. C., assistant to the president of the Southern Railway, but the cost of this service is borne by the employees.

Mr. Mahoney announces that a contract has been made with the Equitable Life Assurance Society, New York City, to underwrite the pension plan and with the Provident Life and Accident Insurance Company, of Chattanooga, for the insurance.

All employees of the Southern and its affiliated companies with a continuous service record of two years, who are under 70 years of age, are eligible for membership in the pension scheme. The plan provides for the purchase of units of a minimum premium of $2.50 a month. Any employee will be permitted to purchase as many units as he may desire, depending upon the amount of income desired at the time of retirement.

There is no compulsory retirement age. The plan provides — for premium-contribution purposes — for those aged 50 and under at date of entry, a retirement age of 65 years, and for those aged 51 and over at date of entry a retirement age of 70. But a member may continue monthly premium payments beyond the ages of 65 and 70, and the amount of the pension income will be increased accordingly,

In the event an employee dies after entering the plan, but before the normal retirement age his or her beneficiary will receive the full amount of the employee's monthly premium payments in one lump sum. No interest is allowed, the association being designed strictly for insurance and not to function as a savings bank. Should an employee die after retirement, his or her beneficiary will receive in one lump sum the difference between the full amount of the employee's monthly premium payments and the pension payments received by the deceased member prior to death.

Should an employee leave the service for any reason other than death, he may continue to make premium payments directly to the Equitable Life Assurance Society; or accept a certificate for the deferred paid-up pension; or cancel the contract and receive cash.

Accidents and Health Insurance

All employees of the Southern and its affiliated companies, regardless of length of service, age, sex or color, who are actively in the service, are eligible for membership in the group accident and health plan without a medical examination. This insurance will automatically cease with the termination of any employee's active service or his retirement on pension. In the event an insured employee is temporarily laid off through no fault of the insured, the insurance will continue to the end of the month for which payments have been deducted from his earnings. The insurance may be continued thereafter for a period not to exceed six months if the employee will pay in advance to the Provident Life and Accident Insurance Company, during the time laid off, the regular monthly premium.

The insurance and pension plans will become effective on November 1. Any employee may avail himself of either or both of them.

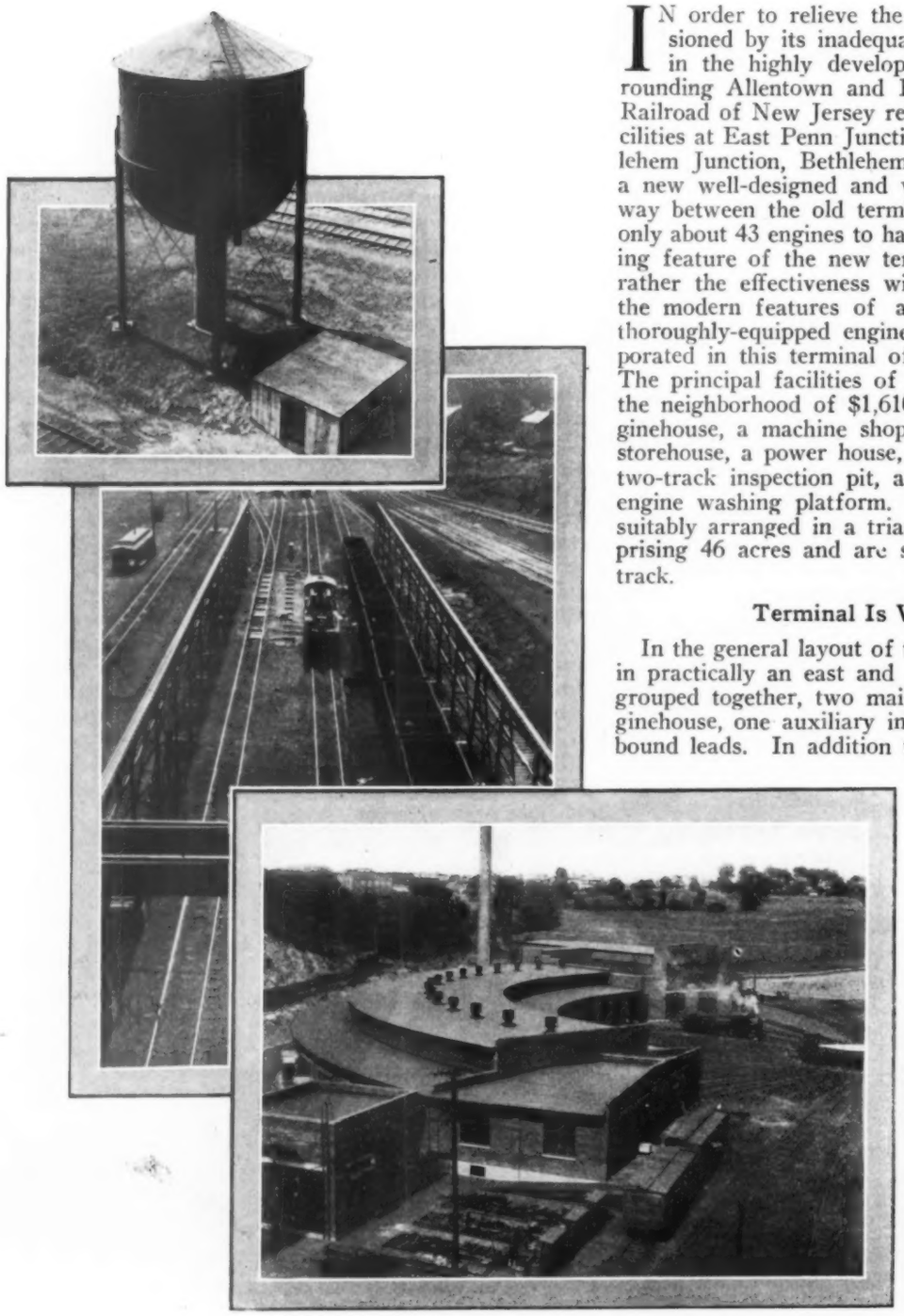
* * *

On the Norwegian State Railways

Eastbound train from Bergen to Oslo, with 4-8-0 locomotive and crew, at Gjeilo.

Small Engine Terminals Can Be Modern

A description of the new, well-designed and well-equipped facilities of the Central Railroad of New Jersey at Bethlehem, Pa.



IN order to relieve the growing congestion occasioned by its inadequate engine terminal facilities in the highly developed industrial district surrounding Allentown and Bethlehem, Pa., the Central Railroad of New Jersey recently abandoned its old facilities at East Penn Junction, Allentown, and at Bethlehem Junction, Bethlehem, and consolidated them in a new well-designed and well-equipped terminal midway between the old terminals. With an average of only about 43 engines to handle each day, the outstanding feature of the new terminal is not its size, but rather the effectiveness with which practically all of the modern features of a large, well-designed and thoroughly-equipped engine terminal have been incorporated in this terminal of relatively moderate size. The principal facilities of the terminal, which cost in the neighborhood of $1,610,000, include a 16-stall enginehouse, a machine shop, a boiler washing plant, a storehouse, a power house, a 600-ton coaling station, a two-track inspection pit, a two-track ash pit, and an engine washing platform. All of these facilities are suitably arranged in a triangular plot of ground comprising 46 acres and are served by about 5 miles of track.

Terminal Is Well Laid Out

In the general layout of the new terminal, which lies in practically an east and west direction, there are, grouped together, two main inbound leads to the enginehouse, one auxiliary inbound lead, and two outbound leads. In addition there is a sixth lead to the

Top—The New 100,000-Gal. Spherical-Bottom Water Tank at the Terminal. Center—Looking West Over the Enginehouse Leads and the Ash Pit. Bottom—The 16-Stall Enginehouse as Seen from the Coaling Station

turntable entirely apart from the main group of leads, which can be used by engines which may be hauling materials to various points at the terminal, or, in emergency, by any road power arriving at or leaving the enginehouse.

In approaching the enginehouse over either of the main inbound leads, engines pass in order over the inspection pit, the ash pit, and then to the coaling station. Just beyond the coaling station on these leads are the engine washing platform and two water columns, from which engines pass directly to the turntable and the house.

Enginehouse Is Modern Throughout

The enginehouse, which is located on the north side of the turntable circle at the east end of the terminal, is a 16-stall structure, 115 ft. deep. It is built on the arc of a circle and is constructed with a steel frame, brick exterior walls, and a monitor-type roof with timber rafters and planking protected by built-up roofing. The windows are of wood with pivoted operating sections; the main entrance doors are of the double swinging type and are also wood, and the floor is concrete. All 16 stalls of the house are equipped with pits, 90 ft. long, adequately lighted, ventilated and drained. In addition, two of the stalls are equipped with a pony truck drop pit and three of the stalls with a driver drop pit with a Whiting drop pit table and an overhead 10-ton monorail traveling hoist. All five of the drop pit tracks are grouped together at the east end of the house.

All of the pits of the house are equipped with heavy concrete jacking walls along both sides, and all of the pit tracks are fitted at their ends with low steel blocks clamped to the rails. The outer circle wall of the house is provided with panels in line with the ends of the pit tracks, which can be knocked out without damage to any other part of the house.

The turntable serving the house is a 100-ft. table of the twin-span, three-point support type, furnished by the Bethlehem Steel Company.

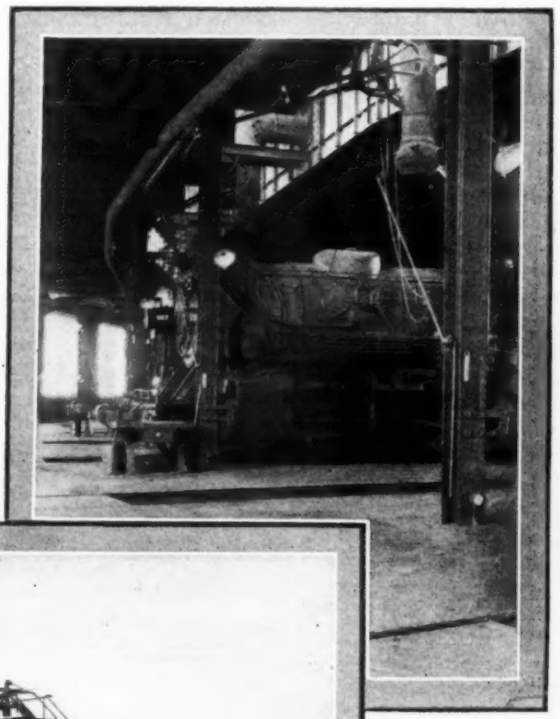
House Has Smoke-Collecting System

One of the special features in the enginehouse is the smoke-collecting system provided to keep the house free from smoke and gas and to speed up the drafting of engines. This system provides flexible smoke jacks, all of which are connected to a large capacity Transite asbestos collecting duct which extends around the house to electrically-operated exhaust fans discharging into a radial brick smoke stack, 150 ft. high.

The smoke jacks at each stall are of the telescoping type, each with a spherical section at the lower end which can be seated snugly on the top of locomotive stacks. The telescoping features of these jacks permits a vertical movement of about four feet and a horizontal movement of about six feet, so that various heights of engine stacks can be accommodated readily and so that accurate spotting of engines in the house is not necessary. All movements of the smoke jacks are effected by individual hoist mechanisms.

Forced draft for the smoke exhaust system is provided by two large motor-operated exhaust fans located at the end of the smoke-collecting duct, in a fan house near the smoke stack. These fans, which are overhead and, therefore, entirely out of the way, are controlled by push buttons at the floor level and can be operated either singly or together, or at either full or half speed as may be required. In order to make drafting and smoke exhaust more effective, each smoke jack is equipped with a damper so that it can be cut out entirely when not in service.

The entire house is served by electric power and lighting lines, air lines, and water and steam lines for the National boiler washing system which is provided. All of the service lines within the house are carried



Above—Interior of the Enginehouse, Showing the Smoke Exhaust System. At the Right—The Turntable is of the Twin-Span Type

overhead near the outer end of the house and are provided with individual drops at the columns located between the head ends of adjacent stalls. All of the drops of the boiler washing system are equipped with Barco lubricated plug valves.

Some of the special equipment provided in the house, in addition to that already mentioned, includes a Westinghouse portable arc welding set, a portable electric boom crane, a lift platform electric truck, vise and tool benches between the head ends of adjacent stalls, and a drop rail in one of the pit tracks, provided so as to make spring repairs possible without the necessity of jacking up engine frames.

Daylighting of the house is afforded by the large areas of sash provided in the entrance doors, the outer circle wall, and in the roof monitor. The sash is glazed with wire glass, and the center-pivoted sections afford natural ventilation of the house when desired. Unusually effective artificial lighting is afforded by the provision of two high-powered electric lights, equipped with reflectors, at each of the four roof-supporting columns between adjacent stalls. These lights, which are located well overhead, are placed back to back, so that at each stall four such lights are directed against the side of a locomotive.

Supplementing this lighting effect, floodlights are located around the inner circle wall of the house, between the doors, and are directed so as to increase the illumination in the working space between the tracks. In addition, a number of extension cord receptacles are provided on the columns between pits.

Heating of the house and, incidentally, forced ventilation, are provided by eight Skinner unit heaters located in suitable enclosures around the outside of the outer circle wall, there being one unit for each two stalls. These heaters, which receive their steam from the terminal power plant, force heated fresh air through separate systems of sub-surface ducts into the engine pits, each of which is provided with three 15-in. openings, suitably spaced along one side so as to secure uniform heating. So arranged, the heating system is also adapted to local heating.

Shop Is Well Designed and Equipped

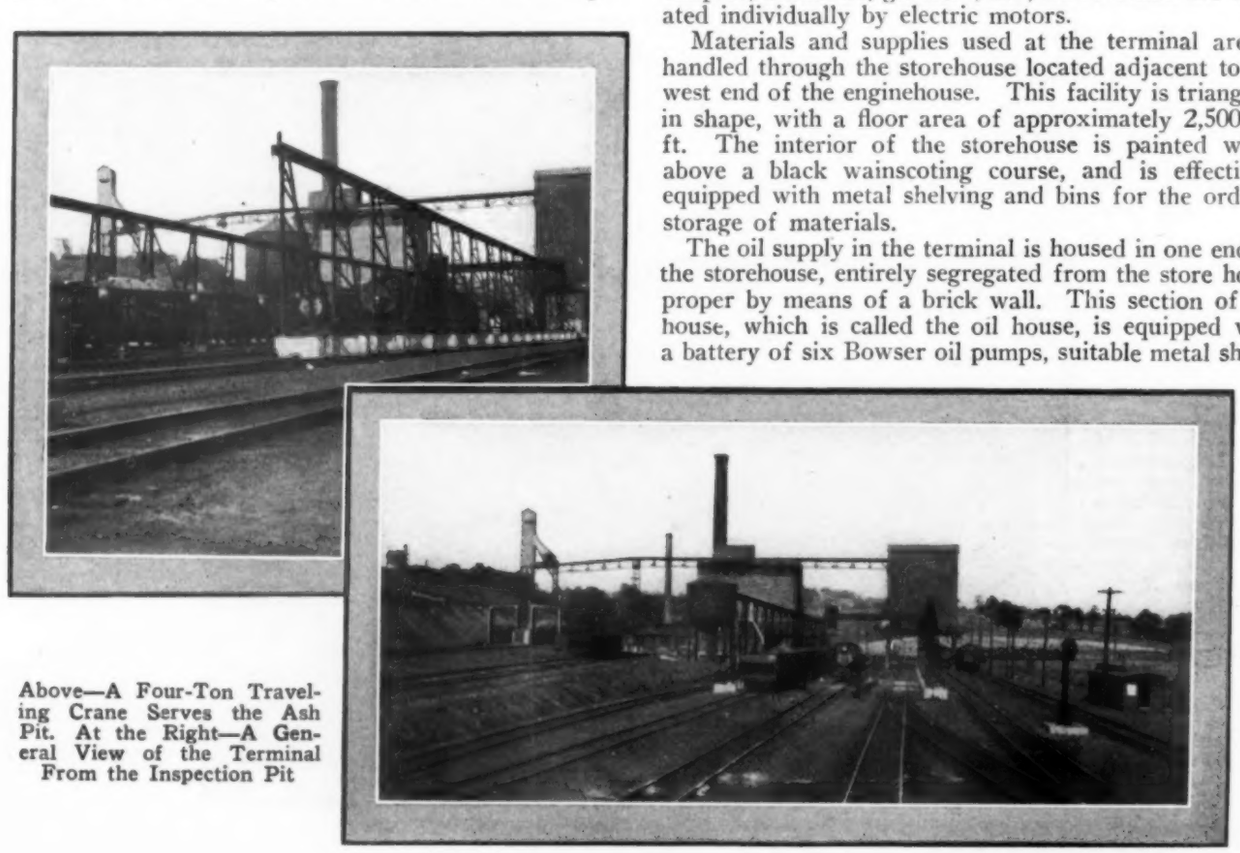
The shop at the terminal is located adjacent to the east end of the enginehouse and is so designed that it will form a connecting link between the present house and an extension to the house which may be required in the future. This shop, which is laid out as one large building with 26,000 sq. ft. of floor space, is a brick structure of the monitor type, with steel columns, structural steel roof trusses and purlins, and a wood roof. One of the special features of the building is the large area of fixed and ventilating sash, of wood except in the monitor, which have been provided on all of its exposed sides, a feature which insures unusually good atmosphere in the shop and precludes the use of artificial lighting anywhere within the building during the daytime.

Within the shop, which is served throughout its length by two tracks direct from the turntable, the floor area is divided into a boiler shop, an electric shop, an air brake shop, a brass shop, a blacksmith shop, a babbitt shop, a machine shop and a tool room. In the main, the flooring throughout the building is constructed of creosoted wood blocks on a concrete foundation, but a concrete floor is provided in the areas occupied by the boiler and babbitt shops, and a cinder floor is provided in the blacksmith shop.

Special facilities and equipment in the shop, which is designed for making Class 3, 4 and 5 repairs, include engine pits in both tracks, with a 200-ton Whiting hoist serving one of the pits; a 40-ton Niles overhead traveling crane, which operates longitudinally throughout the length of the center bay and serves both tracks; a 200-lb. low-head electric hoist in the babbitt shop; and a complete layout of shop tools, such as lathes, drills, shapers, hacksaws, grinders, etc., all of which are operated individually by electric motors.

Materials and supplies used at the terminal are all handled through the storehouse located adjacent to the west end of the enginehouse. This facility is triangular in shape, with a floor area of approximately 2,500 sq. ft. The interior of the storehouse is painted white above a black wainscoting course, and is effectively equipped with metal shelving and bins for the orderly storage of materials.

The oil supply in the terminal is housed in one end of the storehouse, entirely segregated from the store house proper by means of a brick wall. This section of the house, which is called the oil house, is equipped with a battery of six Bowser oil pumps, suitable metal shelv-



Above—A Four-Ton Traveling Crane Serves the Ash Pit. At the Right—A General View of the Terminal From the Inspection Pit

ing and a large waste bin. The oil is stored in tanks in the basement.

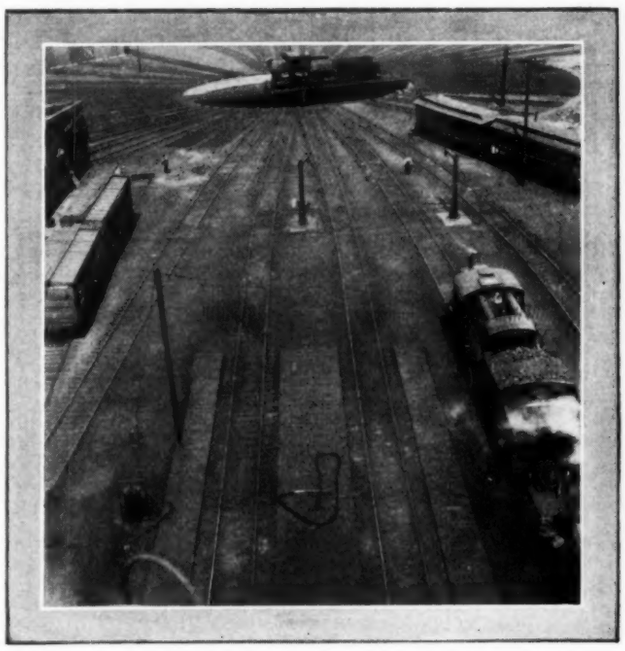
The power house is a steel frame brick structure, 83 ft. long by 43 ft. wide, with a concrete floor, and is equipped with two 335-hp. Kingsford boilers, both of which are fired by Coxe automatic stokers and served by special ash-handling equipment. The principal auxiliary power unit in the house is a 1,500-cu. ft. Ingersoll-Rand air compressor which furnishes all of the compressed air used at the terminal. The coaling station, which was built by the Roberts and Schaefer Company, is a 600-ton reinforced concrete structure spanning two tracks, but serving all four of the main enginehouse leads. This station, which handles about 10,000 tons of coal a month, has three pockets for different grades of coal, one of them having a capacity of 300 tons, while the other two have capacities of 150 tons each. All of the pockets extend across the full width of the station so that coal from each of them can be delivered to any of the four leads.

The coal supply at the station is delivered on two coal tracks along the north side of the terminal, each of sufficient length to hold 15 cars. In addition to these two tracks, two coal storage tracks, with a combined capacity of 26 cars, are also provided.

Delivery of the coal to the pockets of the station is by means of a three-ton skip hoist which operates within a structural steel elevator tower, 84 ft. high, located between the coal supply tracks. From the tower, which is served by two track hoppers and two Schraeder feeders, the coal is carried to the coaling station over a structural steel bridge about 230 ft. in length and 50 ft. above the ground, in a three-ton tram car. The entire operation of the coaling station is automatic from the time the coal is dumped into the track hoppers until it is placed in the proper pockets of the station for delivery to locomotives.

Sand delivery is provided through a 100-ton wet sand storage bin and two Beamer sand dryers located at the ground level, and two 20-ton dry sand storage bins located overhead in the coaling station. Delivery of the dry sand to the storage bins is by compressed air, while delivery of the sand to locomotives on all four leads is by gravity.

One of the special features incorporated in the coaling facilities is the arrangement whereby the coal hoisting equipment also serves the power house. In effecting this, the tramway bridge connecting the elevating tower and the coaling station was made to pass directly along the west face of the power house, and was provided with a tripping mechanism which can be set to cause the tram car to discharge its contents into a chute

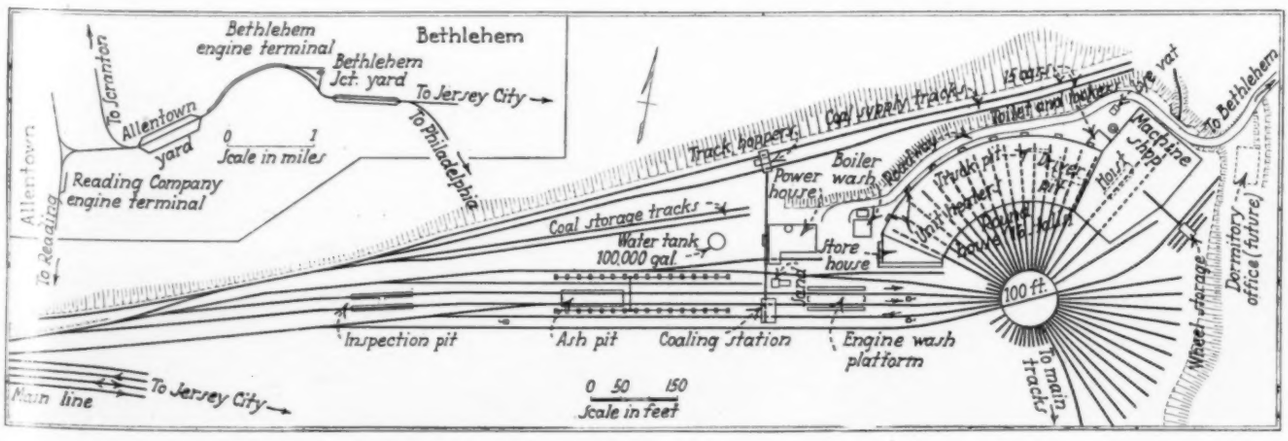


The Engine Washing Platforms and Turntable as Seen From the Coaling Station

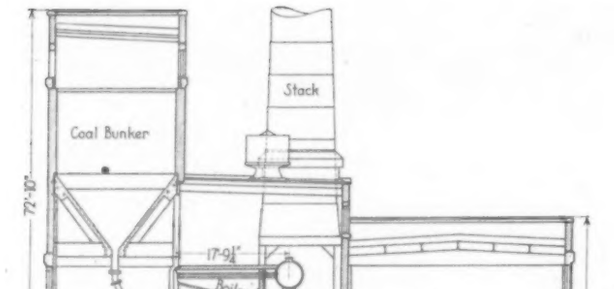
leading directly to the large coal bin in the power house. This bin, which is located above and in front of the boilers, feeds the coal directly to the stokers.

The handling of cinders at the power house is also done in an effective manner. The cinders are collected in individual steel hoppers directly beneath the boilers, and subsequently are emptied into a tram car which operates on a track at the basement level. The loaded tram car is pushed over the track to an ash hoist shaft at the southwest corner of the house, and at that point is elevated by an electric hoist which carries the car to the top of a large overhead ash hopper in the power house and dumps it automatically. Ashes from the hopper are drawn off into cars spotted on a special cinder track directly under the ash hopper along the south side of the power house.

The locomotive inspection and ash pits at the terminal serve both of the main inbound leads to the enginehouse. The inspection pit is of concrete construction, 100 ft. long, and consists essentially of two separate pits, one under each track, joined together by an entrance well at the mid-point of their lengths. These pits are well drained and well lighted for night inspection, artificial light being provided through ex-



General Plan of the Bethlehem Engine Terminal



A Section Through the Power House Showing the Boilers and Coaling Equipment

tension cord receptacles in the side walls of both sections of the pit and by a row of six overhead lights, equipped with reflectors, along both sides of each section.

The ash pit, which is of the wet type, has a capacity of 500 cu. yd. and is capable of accommodating four engines at a time. It is rectangular in section, 105 ft. long, and of concrete construction throughout, except for the girder beams and fastenings which carry the inside rail of each track over the pit, and the 100-lb. rails set two feet apart longitudinally in the floor of the pit to prevent mechanical damage to the concrete. Ashes are removed from the pit by means of a four-ton Niles traveling crane equipped with a 1½-yd. Blaw-Knox bucket, which spans the two lead tracks and a cinder car track and travels on two structural steel craneways. These craneways are 300 ft. long and thereby provide for the installation of a second ash pit in the future if the necessity arises.

One of the special features of the pit is the timber grating which covers the entire area of the pit between tracks and precludes the possibility of anyone falling into the pit. This grating, which is made up of 14 units, 13 ft. 8½ in. long by 7 ft. 6 in. wide, has a deck structure of 2-in by 4-in. pieces spaced approximately 6 in. center to center and held together by a suitable frame. A 3-ft. length of 15-in. I-beam in the center of each unit acts as a lifting bale by means of which the various units can be picked up and moved about by the overhead crane. Through this arrangement the entire pit between tracks is kept covered except at the specific point at which the crane is working.

The engine washing platform, which extends alongside and between the two inbound enginehouse leads is merely a low plank structure, 100 ft. long. Washing of the engines at this point is done by spraying them with a mixture of crude oil and hot water.

Water Supply and Drainage

The water supply at the terminal is secured normally from a canal nearby, but connection is also had with the city water supply of Bethlehem. In the railroad's own system, there are two 6-in. electrically-operated single-stage centrifugal pumps of 1,000 gal. per min. capacity each, which, under automatic control, pump the canal water into a 100,000 gal. spherical bottom steel tank erected by the Pittsburgh-Des Moines Steel Company. Delivery to locomotives is by three 10-in. Sheffield water columns. The drinking water system at the terminal is entirely independent of the boiler water system and is connected directly to the city water supply. In the sewer system provided, all waste water from the shops passes through oil traps and is then discharged into the Lehigh river, nearby.

Among the large number of contractors employed in the construction of the terminal, those which had the more important work included C. W. Strayer, Harrisburg, Pa., who constructed the enginehouse, machine shop and the boiler washing house; Joseph E. Nelson & Sons, Chicago, who constructed the power house; F. H. Clement & Co., Bethlehem, Pa., which constructed the inspection pit, ash pit and turntable pit; and James A. Hart Company, New York, which did the 200,000 cu. yd. of grading necessary. All of the engineering and design in connection with the construction of the terminal was carried out by the engineering department of the railroad.

* * * *

Boston & Albany Freight Train, Hauled by Berkshire Type Locomotive

President Hoover's Waterway Policies

DECLARING himself in favor of the "modernizing of every part of our waterways which will show economic justification," but without defining what he means by "economic justification" in this respect, President Hoover took occasion to enunciate the policies of his administration as to waterway development in an address delivered at Louisville, Ky., on October 23 in celebration of the completion of a nine-foot channel in the Ohio River from Pittsburgh to Cairo.

As he has stated before, the President again said "the new waterways are not competitive but complementary to our great and efficient railways." It is the history of transportation, he said, that "an increase of facilities and a cheapening of transportation" increase the volume of traffic. With that he dismissed the subject of "cheapness," on the ground that what the American people desire is "action, not argument."

He also advocated private enterprise in substitution for government operation, although he said we must continue government barge lines through the pioneering stages.

In enunciating his policies President Hoover said:

1. As a general and broad policy I favor modernizing of every part of our waterways which will show economic justification in aid of our farmers and industries.

2. The Mississippi system comprises over 9,000 miles of navigable streams. I find that about 2,200 miles have now been modernized to 9 feet in depth, and about 1,400 miles have been modernized to at least 6 feet in depth. Therefore some 5,000 miles are yet to be connected or completed so as to be of purpose to modern commerce. We should establish a 9-foot depth in the trunk system. While it is desirable that some of the tributaries be made accessible to traffic at 6 or 7 feet, yet we should in the long view look forward to increasing this latter depth as fast as traffic justifies it.

This administration will insist upon building these waterways as we would build any other transportation system—that is, by extending its ramifications solidly outward from the main trunk lines. Substantial traffic or public service can not be developed upon a patchwork of disconnected local improvements and intermediate segments. Such patchwork has in past years been the sink of hundreds of millions of public money.

3. We must design our policies so as to establish private enterprise in substitution for government operation of the barges and craft upon these waterways. We must continue government barge lines through the pioneering stages, but we must look forward to private initiative not only as the cheapest method of operation but as the only way to assured and adequate public service.

Completion of Mississippi System

4. We should complete the entire Mississippi system within the next five years. We shall then have built a great north and south trunk waterway entirely across our country from the Gulf to the northern boundaries, and a great east and west route, halfway across the United States. Through the tributaries we shall have created a network of transportation. We shall then have brought a dozen great cities into direct communication by water; we shall have opened cheaper transportation of primary goods to the farmers and manufacturers of over a score of States.

5. At the present time we have completed 746 miles of intracoastal canals. We still have approximately 1,000 miles to build. We should complete this program over a period of less than 10 years.

6. We should continue improvement of the channels in the Great Lakes; we should determine and construct those works necessary for stabilizing the lake levels.

7. One of the most vital improvements to transportation on the North American Continent is the removal of the obstacles in the St. Lawrence river to ocean-going vessels inward to the Great Lakes. Our nation should undertake to do its part whenever our Canadian friends have overcome those difficulties which lie in the path of their making similar undertakings. I may say that I have seen a statement published lately that this improvement would cost such a huge sum as to make it entirely uneconomical and prohibitive. To that I may answer that after we have disposed of the electrical power we could contract the entire construction for less than $200,000,000, divided between the two governments and spread over a period of ten years.

8. We shall expedite the work of flood control on the lower Mississippi in every manner possible. In the working out of plans we find it necessary to reconsider one portion of the project, that is, the floodway below the Arkansas, but work in other directions will proceed in such fashion that there will be no delay of its completion under the 10-year program assigned to it.

9. With the increasing size of ocean-going vessels and the constantly expanding volume of our commerce, we must maintain unceasing development of our harbors and the littoral waterways which extend inland from them.

10. The total construction of these works which I have mentioned amounts to projects three and four times as great as the Panama Canal. In order that there may be no failure in administration, and as an indication of our determintion to pursue these works with resolution, we have in the past month entirely recast the organization of this executive staff in the government. With the approval of the Secretary of War, and under the newly appointed Chief of Engineers, we have assigned to each of these major projects a single responsible engineer. We thus secure a modern business organization, direct responsibility, and continuous administration. We wish to see these projects completed with all the expedition which sound engineering will permit. We shall be able by this means to place responsibility, without question in failure, and to give credit without question to the men who bring these great projects to successful completion.

Annual Cost

At the present time we are expending approximately $85,000,000 per annum on new construction and maintenance of these works. To complete these programs within the periods I have mentioned will require an increase in the government outlay by about $10,000,000 per annum not including the St. Lawrence; at most, including that item, an increase in our expenditures of say $20,000,000 a year. A considerable proportion of this will end in five years' time. It is of the nature of a capital investment.

This annual increase is equal to the cost of one-half of one battleship. If we are so fortunate as to save this annual outlay on naval construction as the result of the forthcoming naval conference in London, nothing could be a finer or more vivid conversion of swords to plowshares.

To carry forward all these great works is not a dream of the visionaries—it is the march of the nation. We are reopening the great trade routes upon which our continent developed. This development is but an interpretation of the needs and pressures of population, of industry, and civilization. They are the threads in that invisible web which knits our national life. They are not local in their benefits. They are universal in promoting the prosperity of the nation. It is our duty as statesmen to respond to these needs, to direct them with intelligence, with skill, with economy, with courage.

A nation makes no loss by devotion of some of its current income to the improvement of its estate. That is an obligation we owe to our children and our grandchildren. I do not measure the future of America in terms of our lifetime. God has truly blessed us with great resources. It is our duty to make them available to our people.

* * *

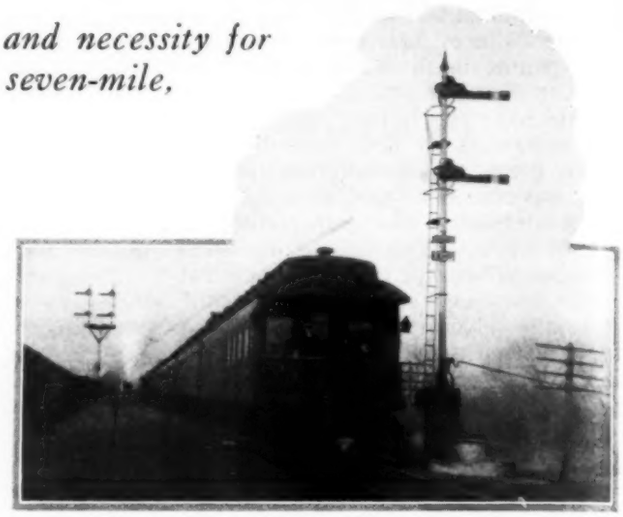
On the Chicago Belt Line

Canadian Pacific Installs

Centralized Traffic Control

to Solve Operating Problem

Train movements expedited, and necessity for second track postponed on a seven-mile, single-track grade



A Time-Saving Meet at the East End of Medicine Hat in Which Neither Train Stopped

THE Canadian Pacific has installed the General Railway Signal Company's system of centralized control for the operation of the switches and the direction of train movements by signal indication on seven miles of single track between Dunmore, Alta., and Medicine Hat. From the east end of the yard at Medicine Hat, an ascending grade of slightly more than one per cent extends to Dunmore. Between these points the line leaves the Saskatchewan river bottoms and ascends along a creek with numerous curves to a higher plateau.

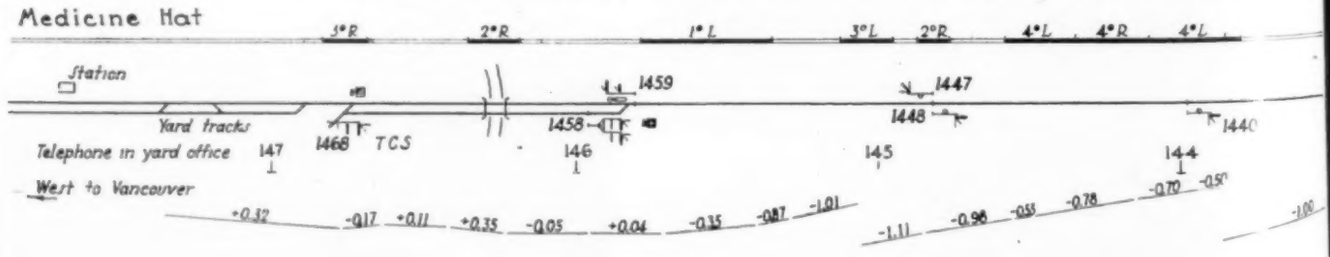
The main-line train movements include five through passenger trains each way daily, in addition to two trains each way daily between Medicine Hat and Macson, for the Lethbridge line. Ordinarily the passenger trains are hauled up the grade with the regular road locomotives, but when they exceed 13 cars, helper engines are required. About eight freight trains are operated each way daily between Dunmore and Medicine Hat, this number being increased considerably during the wheat movement in October and November. A road engine can handle 1,100 tons up the hill from Medicine Hat to Dunmore in a running time of about thirty minutes.

The freight trains to and from Lethbridge, terminate at Dunmore, bringing in a great deal of coal, wheat and other agricultural products. Freight trains from Medicine Hat fill out from this traffic to 2,800 tons for movement eastbound to the end of the subdivision.

Prior to the installation of the centralized signal control system, an electric staff system was used. This required a conductor of a train to go to the office at Medicine Hat to secure the staff, which he carried to the head end of the train to show to the engineman as evidence that they had authority to proceed to Dunmore; the conductor then returned to the caboose. After the train pulled out of the yard and the switch had been closed, it was delayed in starting up the grade and if the train entered the yard at Dunmore, another stop was required to permit the switch to be operated, after which the conductor walked the length of the train to the office to turn in the staff. All of this procedure required about an hour. The same process was followed for a westbound movement, the only difference being that the train made a quicker movement down the hill than when going up; nevertheless, the same amount of time was wasted in the handling of the staff.

Because the eastbound trains were leaving their terminal, they were given preference in order to eliminate payment for initial terminal delay time. The result was excessive delays of westbound trains which were ready to move from Dunmore down the hill to Medicine Hat. These delays became so serious in heavy traffic seasons, that consideration had been given to the construction of a second track. However, with the installation of the centralized control system, the trains are now handled satisfactorily.

Under the new method of operation, no train orders are used and all rights by direction or class are eliminated; all train movements are directed by signal indication and the yard lead switch at Dunmore, as well as the one at Medicine Hat, are power-operated. This sys-



Track and Signal Plan Showing Curvature

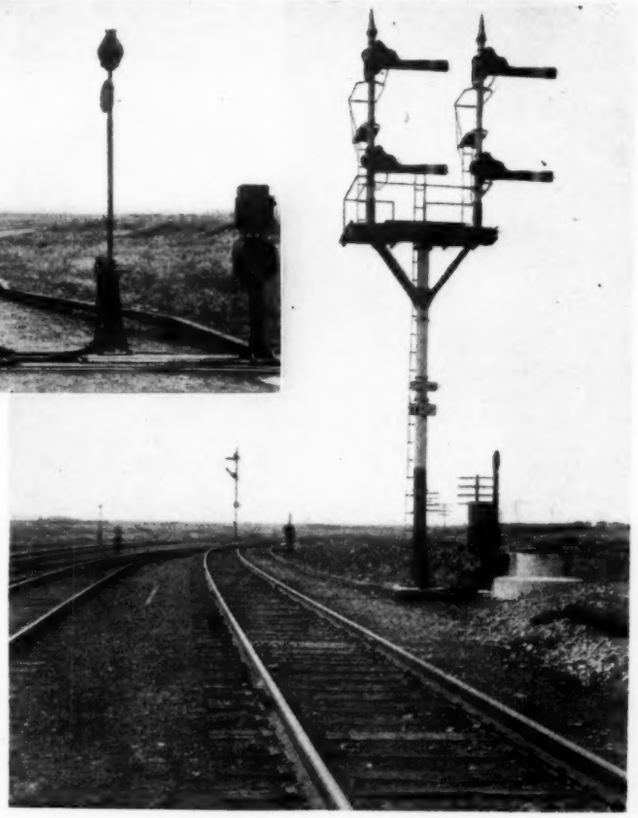
An Electric Lock is Used for the Junction Switch at Macson

tem, therefore, eliminates train stops to pick up the staff or to handle the switches, and as soon as a train arrives at either yard or station, the track is available immediately for use by another train. A movement can now be made up the hill in about 30 minutes or downhill in about 15 minutes. As a result, the westbound freight trains that were previously delayed at Dunmore can be moved down the hill to Medicine Hat between other scheduled trains without delay. In several cases during the last six months, over two hours delay were avoided at Dunmore. For instance, on March 27, an extra train saved 2 hr. 25 min., on April 8, another train saved 2 hr. 37 min., on August 26, an extra freight saved 2 hr. 25 min., and such cases are evident from the dispatcher's sheet nearly every day.

Likewise, eastbound trains can be moved out of the yard at Medicine Hat when they are ready, which fact permits the dispatcher to plan train movements definitely all the way through to the east end of the subdivision, whereas under the old system he could not do so until the train was ready to move out of Dunmore.

The control machine is located in the office at Dunmore, and is handled by the operator, under the general direction of the dispatcher. The machine has four working levers, with spare spaces for eight more to allow for the operation of additional switches in this section as well as for an extension of the control system eastward. One lever controls the entrance signal on the main line at Medicine Hat, another lever controls the switches and signals at the east end of the yard at Medicine Hat, a third lever handles the same functions at Dunmore, while the other lever directs train movements at the junctions switch at Macson.

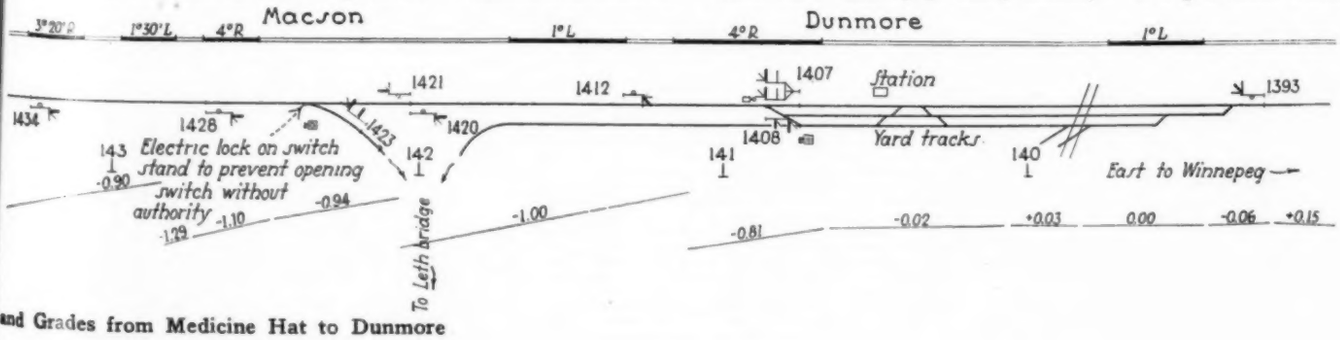
As this switch is used only by the four passenger trains to and from the Lethbridge line, it was not considered necessary to provide a power switch machine at this point. Signals are provided to direct train movements, and an electric lock connected with this switch is under the control of the operator. When a trainman arrives at this switch he opens the door of the lock stand, pushes a button and if the operator is ready for the train to use the switch, he throws the lever which causes the lock to be released, as indicated by the miniature semaphone in the lock case. The trainman then throws the switch and the signal is cleared for the movement.



A View Looking West at the West End of Dunmore

The position of a train is automatically "OS" ed when passing each yard switch, the junction at Macson, and the entrance signal at Medicine Hat. A graphic train sheet operates to make a record of the train movements. Annunciators operate to indicate the approach of trains, so that the operator can line up a route in advance of arrival. Telephones are provided at each switch, to be used by trainmen when necessary, and the power switches are equipped with selector levers to permit manual operation in case of a failure, or when making switching movements. The intermediate automatic signals are so located as to give a seven-minute spacing between trains, a time-distance study of actual train operation having been made to determine the proper locations for each signal.

The entire signaling system is operated on direct current furnished by primary battery. The pole line work



and Grades from Medicine Hat to Dunmore

The Control Machine is in the Dunmore Office

is of open-wire construction, no cable being used. The installation was made by the Canadian Pacific signal forces, according to the regular signal and interlocking standards of this road.

Freight Car Loading

WASHINGTON, D. C.

REVENUE freight car loading for the week ended October 12 totalled 1,179,008 cars, a reduction of 11,733 cars as compared with the corresponding week of last year, but an increase of 59,001 cars over the same week in 1927. Increases over the corresponding week in 1928 were reported only in the Pocahontas Central Western and Southwestern districts, but all districts except the Southern showed increases as compared with 1927. Loading of coal, coke, ore and merchandise increased over both 1928 and 1927, while decreases as to both years were shown in the case of grain, livestock and forest products. The summary, as compiled by the Car Service Division of the American Railway Association, follows:

Revenue Freight Car Loading

Week Ended Saturday, October 12, 1929

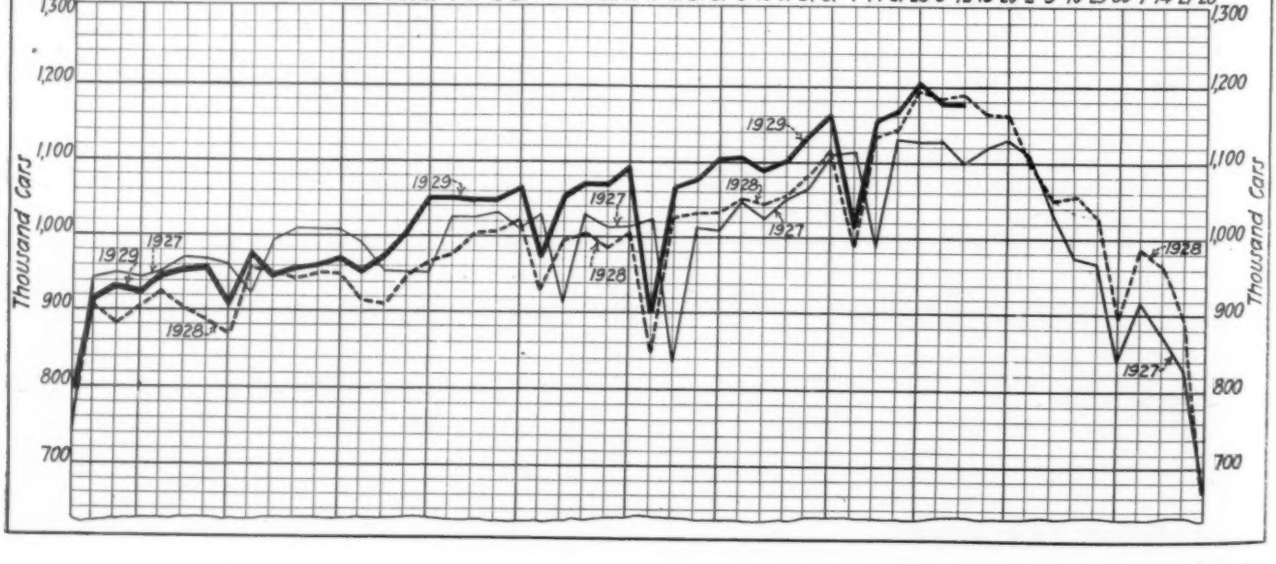
Districts	1929	1928	1927
Eastern	258,367	264,309	239,990
Allegheny	235,417	236,687	214,990
Pocahontas	67,306	65,766	59,496
Southern	161,077	164,915	161,241
Northwestern	174,989	179,009	173,856
Central Western	183,944	183,312	180,689
Southwestern	97,908	96,743	89,845
Total Western Districts	456,841	459,064	444,390
Total All Roads	1,179,008	1,190,741	1,120,007
Commodities			
Grain and Grain Products	46,804	56,811	52,416
Live Stock	35,682	38,384	40,772
Coal	211,474	207,940	196,508
Coke	12,097	10,991	9,652
Forest Products	64,693	66,717	66,484
Ore	61,410	60,686	52,065
Merchandise L.C.L.	270,876	269,892	268,544
Miscellaneous	475,972	479,320	433,566
October 12	1,179,008	1,190,741	1,120,007
October 5	1,179,047	1,187,032	1,102,994
September 28	1,202,111	1,196,965	1,126,903
September 21	1,166,330	1,144,131	1,126,402
September 14	1,153,062	1,138,060	1,127,643
Cumulative total, 41 weeks	42,237,641	40,602,535	41,395,755

The freight car surplus for the week ended October 8 averaged 111,458 cars, a decrease of 7,065 cars as compared with the preceding week. This surplus included 67,194 box cars, 17,967 stock cars, 14,121 coal cars and 5,021 refrigerator cars.

Car Loading in Canada

Revenue car loadings at stations in Canada for the week ended October 12 totalled 78,069 cars, a decrease from the previous week of 1,363 cars and a decrease of 13,981 cars from the same week last year.

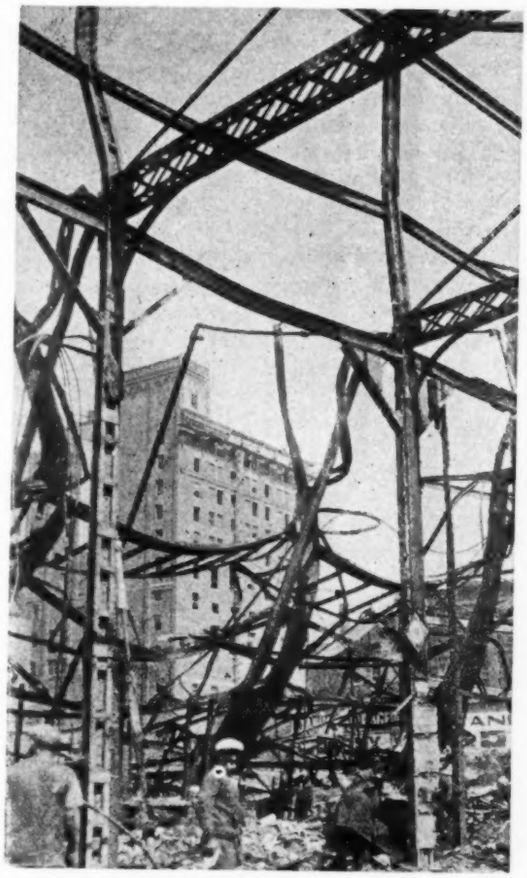
	Total Cars Loaded	Total Cars Rec'd from Connections
Total for Canada		
October 12, 1929	78,069	42,147
October 5, 1929	79,432	43,300
September 28, 1929	85,580	41,396
October 13, 1928	92,050	42,597
Cumulative Totals for Canada		
October 12, 1929	2,817,442	1,687,405
October 13, 1928	2,810,336	1,610,812
October 15, 1927	2,573,292	1,541,672



Railway Fire Association Meets at Toronto

Earnest efforts of members makes losses in 1928 lower than in any year since 1920

A DECREASE in fire losses from $10,563,914 in 1920 to $5,328,631 in 1927 and $4,508,112 in 1928, was reported by the Committee on Statistics at the sixteenth annual meeting of the Railway Fire Protection Association held at the Royal York Hotel, Toronto, Ont., on October 15, 16 and 17. The meeting, which was attended by 150 representatives of railroads in the United States and Canada, was presided over by President F. R. Bradford, supervisor of fire protection and safety agent of the Boston & Maine. It was marked by a number of valuable addresses and by several informative committee reports. In selecting a place for the 1930 meeting, Cleveland, Ohio was recommended to the Executive committee by a majority of the members present. The selection of officers for the ensuing year resulted in the election of the following: President, E. Moore, insurance commissioner of the Canadian Pacific; vice-president, W. F. Hickey, superintendent of insurance of the New York, New Haven & Hartford; and secretary-treasurer, R. R. Hackett, chief inspector, of the Baltimore and Ohio (re-elected).



What Might Still Be a Useful Passenger Station

Interesting Speakers on Program

The address was made by President Bradford, who outlined the history of the association and explained the value of fire prevention work in relation to other departments and the management as a whole. He said in part:

"By using the 1920 fire waste figure as a mean level, the apparent aggregate savings to the railroads of the United States and Canada represented in this association in the eight succeeding years to and including 1928, amounts to the grand total of $39,094,000. In other words, had no reduction been made from the 1920 fire waste experience, it would have cost the railroads over $39,000,000 more in fire losses than was actually the case. There is the tangible evidence of the value of the intensive fire protection efforts that you individually as well as collectively have been making in the interest of your employers.

"Apart from the actual saving of physical property, great as it is, the more important benefit, accruing from the prevention of fires, is the freedom from interruption to service which is the one thing the railroads have to sell. The public demands that they be furnished fast, on-time service and the expeditious delivery of its goods in good condition. It is our duty as fire-protection engineers to see that, so far as it is within our possibility of control, no fire occurs or spreads to make it impossible for our roads to meet this legitimate demand. Your success in eliminating interruptions caused by fires cannot be stated in definite terms of dollars and cents but it must be obvious that, a total reduction of 10,486 in the number of fires reported as compared with 1920, reflects on equal reduction in the potential chances for disturbance in the operating program.

"We must in some way build up a fire safe consciousness in the mind of every railroad man and, as I see it, this can only be brought about by positive action on the part of the supervisory officers. It has been truly said that any shop, station or division is just as free from fire as the officers in charge of that shop, station or division wants it to be. He is the man who can if he will, establish and put into effect the standards of cleanliness, care and order so fundamental to the prevention of fire and he alone can command obedience to orders tending to the elimination of careless acts and practices.

"It is no small task to bring your supervising officers to the point of recognizing their responsibility for the elimination of causes and the prevention of fires, but the responsibility is theirs whether they know it or not. If you have not already done so, I strongly recommend that you analyze your fires over a period of years, allocate those due to avoidable causes to the various officers under whose jurisdiction they occurred and show them how the fires could have been avoided, pointing out similar practices or conditions in other places that eventually will result in fires unless eliminated. In other words, work on and with your supervisory offi-

The Lading As Well As the Cars Was a Total Loss

cers to the end that wastage by fire will no longer be a drain on the resources of our railroads and a cause for complaint from our patrons."

Grant Hall Describes Fire Prevention and Protection on Canadian Pacific

In the absence of Grant Hall, vice-president of the Canadian Pacific, because of illness, H. J. Humphrey, assistant to the vice-president, read Mr. Hall's paper, describing fire prevention and protection on that railroad and inviting the members of the association to visit the Canadian Pacific's new Toronto roundhouse which embodies the direct steaming system for locomotives. "The question of fire prevention and protection," he read, "is always given very serious consideration by the Canadian Pacific. We have very large shop premises and a number of fine hotel properties, as well as inland, coastal and ocean steamships, representing, altogether, a very large investment. We maintain our own inspection service under the direction of our insurance commissioner and each insurance inspector carries a card of identification which gives him access to all property and buildings at all times.

"On this card is a request that co-operation in fire inspection work be given by all concerned, and that when defects, which can be remedied without loss of time and at little expense, are found, they be attended to immediately so as to eliminate fire hazards. That we get good results from these inspections is evident on all sides.

"Of course, this sounds all right, but we are not always in accord with all the recommendations that are made and occasionally have to call a halt, particularly when 75 per cent or more of our frame buildings are recommended to be torn down at once, and replaced by fire-resistive structures. Ofter when the time to make appropriations comes around we have to hold over some of the recommendations for another day, but with the constant visits made by the insurance inspectors and the educational program which they carry out, we find that everyone is alert to the fire dangers.

"At our Angus shops in Montreal, which cover 231 acres and employs approximately 9,500 men, we maintain a permanent fire brigade of eight men, beside voluntary fire brigades composed of the employees of the larger buildings. At other important terminals and in hotel premises, we have organized fire brigades consisting of men who are well trained for that work. In 1917, we formed an insurance fund by carrying part of the insurance ourselves and the fact that we maintain and operate this fund is constantly impressed upon our officers and employees."

W. D. Robb, vice-president of the Canadian National, described the development of fire prevention on that railroad and outlined the benefits resulting. "Early in 1923" he said, "it was decided that the properties of the Canadian National were no longer to be insured with outside companies, but that the premiums were to be paid into the company's own insurance fund. An experienced inspection staff was organized to make regular inspections of the company's properties, examine and correct defects in fire fighting appliances and eliminate fire hazards as much as possible. In addition, an educational campaign was instigated among the employees.

Canadian National Uses Committees

"At the different shops and terminals, fire prevention committees, composed of supervising officers, were formed. These committees, due to the presence of their members at various locations during working hours are in a position to learn of any hazardous conditions, as well as any defects in fire fighting facilities, and can take steps to see that the necessary correction is made at once. Most of these committees meet monthly and keep minutes showing what hazards or defects were observed and corrected. The recommendations of the committees respecting changes involving expenditures are forwarded to the director of insurance for review and necessary action.

"Beside these committees a number of divisional committees have been organized. These deal with places outside of the shops and terminals and, in some instances, review the recommendations of terminal fire-prevention committees.

"Volunteer fire brigades have been established at practically every point of importance on the system. At present we have no less than 150 of them. Drills are held semi-monthly, and the teams compete annually for trophies donated by the company. Insurance covering accidental injury or death during drills or while fighting fire is provided for all members of fire brigades.

"During the past six years, considerable expenditures have been made to eliminate fire hazards, to improve water systems for fighting fires and to install automatic fire-alarm systems. In addition, the company has provided a substantial amount of fire fighting equipment such as hose, extinguishers, water barrels and pails.

"Certain standards have been adopted in connection with the insulation of ranges and heating appliances in buildings and rolling stock, the cleaning of air brakes, and the operation and maintenance of locomotive fire-fighting equipment. Fire prevention rules have been formulated for the information and guidance of em-

An Atlantic Dory-Type Boat Equipped with a Motor Pump Is Effective at Pier Fires

ployees. All our fire losses of importance are thoroughly investigated to determine the cause and the steps advisable to prevent a recurrence.

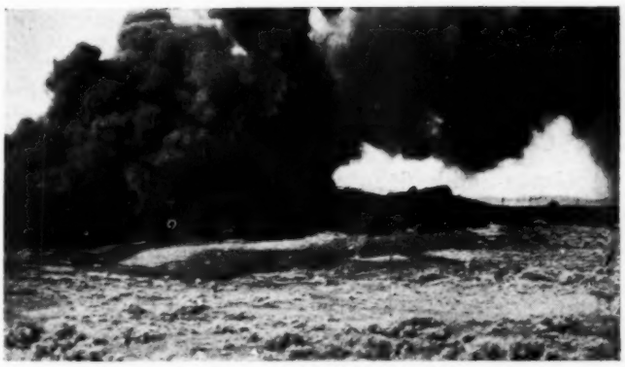
"Now, what has been the result of all these efforts to reduce fire losses? For the five years, from 1923 to 1928, our annual fire losses were only slightly more than one-half as great as during the preceding five years, the actual reduction being approximately 46 per cent, in spite of a material increase in the value of burnable property—surely a remarkable performance. The reduction was not confined to any particular district or locality, but was general throughout the system.

"Of the fires which occurred last year, 58 per cent were extinguished by our own employees without outside assistance, and 24 per cent were extinguished before losses greater than five dollars had occurred. The majority of the fires occurred in rolling stock or in small properties located in rural communities where only a limited amount of fire protection is available. Largely as a result of our fire-prevention work, our insurance fund has grown to very large proportions and before very long will have reached the point where the interest on the fund alone will be sufficient to pay all our fire losses and we will be in a position to discontinue all fire-insurance premiums."

Fire Insurance Is An Economic Necessity

E. B. Berry, superintendent of insurance of the Southern, read a paper in which he decried the attitude of indifference implied and conveyed by such expressions as: Why are we so particular in regard to fire prevention when the building is insured? Why bother with insurance if the cost or premium must be sufficiently high to develop profit for the underwriter? Why not make the fire loss an operating charge? He said that fire prevention is valuable since fire creates a definite hazard to life, 10,000 lives being sacrificed in the United States each year as a result of fire. In addition the fire waste of any corporation or community is inversely proportional to the interest taken by that corporation or community in fire prevention and protection. Indifference to conservation breeds carelessness and is the forerunner to economic degeneration. Likewise, fire diminishes cash assets; the cost of insurance for railroad risks is based largely upon the loss record; and there is always an intangible operating loss not covered by insurance.

Car Shed Fires Add Materially to Rolling Stock Losses



This Fire Was Not Entirely Successful. It Was Not in a Congested Area

"The policy holder," he continued, "looks to the insurance collected to replace losses as a consequence of fire. This is a comforting thought to the individual, but insurance functions to distribute losses, and nothing can be done to restore the destroyed wealth. The thing that confuses is that losses by fire are looked upon as dollars of loss, which thought conceals the real truth that what we lose is not dollars but wealth, the thing needed to produce other wealth. If this thought is clear, you may appreciate what it means to the railroads to lose annually by fire, wealth in property valued at $8,000,000. Knowledge of fire prevention, coupled with thought application, will materially reduce the loss ratio.

"When I think about fire prevention, one phase of the subject arises in my mind; that is the necessity of constantly teaching carefulness in regard to fire. This appears to be a never ending task and I should hate to think that our fire prevention progress was dependent upon so uncertain a premise as the instinctive carefulness of the average individual. It seems to be necessary, if any impression is to be made, to create, if possible, a habit of caution and carefulness on the part of the individual employee, by constant reiteration and preachment of fire prevention.

"Our effort is to influence thought in the direction of producing a minimum loss ratio as a definite accomplishment; in other words, we must develop a positive in fire prevention, or more specifically, a fire conscience, to the same degree we now have with respect to explosives. Let us accept individual responsibility to prevent fire, and refuse to tolerate for a single moment any known fire hazard that might be corrected. A fire cannot occur from a hazard removed.

"There are three things you can do to a fire, prevent it—confine it—extinguish it. The first is the easiest and least expensive.

"In respect to the principle of insurance, it is true the rate must produce sufficient premium, not only to pay losses and operating expense, but to permit a small portion of the amount collected to be set aside as a reserve for conflagration losses. The rate charged the railroad is based on an average loss ratio, plus an amount necessary to build up a reserve, in other words, the rate charged includes not only the loss ratio, but an added charge for catastrophe losses. It is the catastrophe loss that is important.

"Insurance is nothing more nor less than making financial provision against certain risks. While fire insurance contracts are seemingly technical, each clause, restriction or warranty is incorporated for the specific purpose of limiting the liability of the underwriters to damage by fire, only so long as the risk involved remains

in normal condition. Rates are based upon construction and occupancy, the areas subject to one fire, the exposure hazard, the fire protection available and the loss record."

Canadian Fire Rate Per Capita Is Less

J. Grove Smith, fire commissioner for the Dominion of Canada outlined the remarkable reduction in fire loss in Canada, citing the loss in 1922 as $54,930,000 as compared with only $36,380,000 in 1928. This reduction, from $6.11 per capita in 1922 to $3.31 in 1928 (United States is $4.70), has been brought about through the organization of prevention officers and the enactment of fire-prevention measures and was accomplished while the actual value of insurable property increased 29.7 per cent or from $7,881,000,000 in 1922 to $10,146,000,000 in 1928. Had no effort been made to reduce loss, the 1928 total, based on 1922, would have been $67,300,000.

He said that by projecting the losses for each year on the 1922 basis, the people of Canada had saved $85,000,000. He also measured the benefit to the public by showing that the insurance rate had decreased from $1.11 to $0.87 in 1928, thereby saving the policy holders $30,000,000 per annum.

The remarkable thing, he said, was that the results were accomplished with an expenditure of only $180,000 by the provincial governments and $9,700 by the Dominion government, the total amounting to $189,700 or a tax of two cents per person per year. A reduction in the number of costly fires has also taken place, there being 175 fires with a loss of over $100,000 in 1922 and only 36 in 1928.

Others addressing the meeting were Franklin H. Wentworth, managing director of the National Fire Protection Association, who gave a philosophical recapitulation of fire prevention work; E. P. Heatom, fire marshall of the Province of Ontario, who described activities in that Province; A. R. Small, vice-president of the Underwriters Laboratories, who outlined the development of the National Electrical Code; and A. R. King, manager of the portable division of Walter Kidde & Co., who spoke on the growth and development of carbon dioxide gas fire extinguishing equipment. H. L. O'Brien, representative of the American Dispatch Telegraph Company described the central station night-watch alarm service which his company maintains. The value of supervised watch service, he explained, is emphasized by the fact that on the basis of a 10-hr. day and a 5-day week, a plant is in operation 2,740 hours out of a possible 8,760 hours or only 32 per cent of the time. During the remaining hours the watchman is alone and must travel his beat which often requires 50 min.—a period during which a fire can make considerable headway.

Committee Reports Contain Much Valuable Information

The Committee on Statistics reported a material and encouraging decrease in fire losses, the total in 1928 being $8,535,088 less than in 1920. During 1928 there were 6,088 fires costing $4,508,112. This is equivalent to 96.6 fires and a loss of $71,557 per railroad, or a loss of $21.81 per mile of line. The average loss per fire was $740 and the loss per day was $12,317.

The greatest loss was experienced in 328 passenger-station fires where the loss totaled $501,602; however, this includes one fire where the damage was $300,000. Other property included in the statistics follow: Engine houses, 98 fires, loss $330,051; miscellaneous shops, 98 fires, loss $304,015; freight stations, 184 fires, loss $299,074; and bridges, trestles and culverts, 344 fires, loss $240,558. Among the causes, locomotive sparks and coals were responsible for 415 fires and a loss of $478,444. The greatest number of rolling stock fires occurred in box cars, the number being 1,388 and the loss $730,403. There were also 394 fires in passenger equipment with a loss of $195,570, and 369 fires in work cars where the damage amounted to $113,891. These fires were ascribed to trespassers, exposure, sparks or coals from locomotives, and spontaneous ignition, in that order.

Other Reports

The Committees on the Protection of Materials in Storehouses, Material Yards, etc., recommended that, so far as possible, lumber be stored without cribbing since fire will not spread as rapidly in a solid pile. The suggestion met with disfavor as the majority of members present felt that the advantage in fire fighting would be overshadowed by the damage to the lumber resulting from warping and decay. This committee also offered recommendations for the construction and protection of storehouses, oil and paint houses, material yards and garages, and the storage of compressed gasses, inflamable liquids, acids and fusees and torpedoes, all of which were adopted.

The Committee on Fire Losses in Rolling Stock considered the general hazards of all types of rolling equipment, power equipment, passenger equipment, freight equipment, maintenance of way and wrecking equipment, and supply train equipment. The report included an analysis of the causes of fires and recommendations for prevention.

The Committee on the Revision of Fuel Oil prescribed requirements for safeguarding the hazards in the storage, distribution and use of oil for fuel. In addition, locomotive tire-removing devices, stationary furnaces and heating were included.

The Committee on Motor Transportation approved the use of motor-coach heating systems which utilize the hot water in the cooling system. These systems usually consist of a small radiator coil tapped into the cooling system of the engine and located at the rear of the engine compartment. A small electric fan run on battery current forces fresh air through the coil and into the passenger compartment.

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Canadian National Station at Noranda, Que.

Capacity Utilization of Railroad Equipment*

Retirement of less efficient locomotives and cars, reduction of empty car mileage, and increase of loading per car needed in interest of shippers and railways

By M. J. Gormley

Chairman, Car Service Division, American Railway Association

A RAILROAD executive is faced with the same problem that faces the manager of any other industry. That problem is, how to use facilities continuously as near the highest point of efficiency as possible? To a railroad man the word "equipment" means rolling stock, that is, locomotives and cars. These facilities on the railroad correspond to machines in the mill or factory. The subject which I propose to deal with briefly is, how the railroads may secure, as nearly as possible, capacity utilization of locomotives and cars.

The time is not yet so far past but that you are all familiar with the railroad situation that existed at the termination of federal control. The activities of industrial concerns in the country were largely confined to war necessities. Renewals of railway equipment for this reason did not proceed during government control on the basis of the previous average yearly retirements and replacements. The effects of this policy were everywhere visible when the railroads were returned to their owners on March 1, 1920. Transportation service was interfered with by labor difficulties during 1920, by a severe depression in business generally during 1921 and, again, by very extensive labor difficulties in 1922. What might be termed, therefore, as the first normal transportation period since the war began with the year 1923.

Since January 1, 1923, there have been put in service 770,609 cars, either new or rebuilt as new. In the same period there were also put in service 14,234 locomotives, new or rebuilt. The highest point of ownership in number of cars occurred in September, 1925. Since that time, not including refrigerator cars, there has been a decrease in the freight car equipment of the railroads by 97,296 cars. The highest point of ownership in number of locomotives occurred in October, 1924. Since that time there has been a reduction of 7,436 locomotives owned. And, yet, the carrying capacity of the cars and the tractive capacity of the locomotives owned is greater now than at the time of the highest point of ownership.

In this same period corresponding improvements have been made in other facilities. These improvements include additional secondary tracks, passing tracks, yard tracks, new ballast, heavier rails, stronger bridges and the like. They have entered into every branch of railroad operation.

To bring about this situation the railroads have made capital expenditures of approximately $5,790,000,000 since January 1, 1923 (1929 figures partly estimated).

This vast expenditure is without question the primary cause of the increase in transportation efficiency that the shippers of the country have experienced during these past six years. Other important factors that have aided in this increased transportation efficiency are the more complete co-ordination of car handling and car interchange between railroads, and improved shipper co-operation with the railroads in more prompt loading and unloading of equipment and by an increase in the use of available capacity.

The results of these expenditures by the railroads, plus the active co-operation of shippers and carriers, show up in the statistics of railroad operation. In the matter of miles per car per day the results secured are shown in Table I.

Table 1.—Miles Per Car Per Day

1920	25.1
1921	22.4
1922	23.5
1923	27.8
1924	26.8
1925	28.5
1926	30.4
1927	30.3
1928	31.3
1929 (7 months)	31.9

Increase over 1920 27.1%

In considering miles per car per day as stated above we should understand that this figure is the total car miles divided by the car ownership. It includes all surplus equipment stored awaiting demand for it, cars in the hands of shippers awaiting loading or unloading and cars being repaired or waiting repairs. We believe a figure that better indicates the improvement that has been made in the actual speed of transportation is the miles actually made by cars while in trains. This figure is computed by multiplying the miles per train hour by 24 and for the period 1920 to 1929 inclusive, is shown in Table 2.

Table 2.—Miles Per Car Per Day While in Trains

1920	247.2
1921	276.0
1922	266.4
1923	261.6
1924	276.0
1925	283.2
1926	285.6
1927	295.2
1928	309.6
1929 (7 months)	316.8

Per cent increase 1929 over 1920, 28.2%

Bearing more directly, however, upon the question of capacity utilization of equipment are the figures representing tons per car, carload traffic originated. These figures do not include l. c. l. freight and, therefore, indicate only the performance of shippers and receivers of carload traffic for the years 1920 to 1929. They are given in Table 3.

* From an address delivered before the Grain Dealers' National Association at Peoria, Ill., on October 15.

It will be immediately clear to you that the first two sets of figures apply very largely to matters over which the railroad has control, except insofar as detention in loading and unloading by shippers affects the miles per car per day. They represent a direct responsibility of railroad management. The third, however, dealing with the tons per car, is a matter of divided responsibility. The railroads must handle the tons which the shippers put in the cars.

You will note in all of these figures which I have given you that, with the exception of tons per car, remarkable progress has been made. But we should remember, in considering the figures as to tons per car,

Table 3.—Tons Per Car, Carload Traffic Originated

1920	34.5
1921	34.2
1922	33.3
1923	34.5
1924	34.0
1925	34.4
1926	35.1
1927	35.1
1928	35.0

that a fluctuation in the classes of traffic of one year as compared with another can raise or lower the average, regardless of what may have been done in that year by individual shippers and the railroads to increase the load per car.

Whatever may be their imperfections, however, these figures taken together measure with reasonable accuracy the improvement that has been made in recent years in the furnishing of adequate and dependable transportation service.

Savings Due to Increased Efficiency

Let us take a look at another phase of railroad operation. It is a well known fact that increased capital expenditures cut down cost of operation. For example, maintenance of equipment expenditures by Class I railroads for the year 1923 were something over $1,465,000,000. In 1928 they were something over $1,166,000,000, showing a decrease of approximately $300,000,000. New and better equipment does not require the same proportional expenditures for maintenance. That is the answer.

Another item that reflects the economies of these capital expenditures is transportation expenses. In 1923 transportation expenses by Class I railroads were somewhat more than $2,321,000,000. In 1928 they were $2,070,000,000. Here, again, is a decrease, amounting to $250,000,000. This decrease occurred despite the fact that gross ton-miles increased in 1928 over 1923 by 11.4 per cent. This is a further evidence of efficient operation.

It is not my purpose to give you in detail an analysis of economies in railroad operation. There have been changes in prices, changes in labor conditions, increased efficiency in the use of fuel, reduction in loss and damage to freight, in personal injury claims and the like. I will, however, cite figures for two of these items. Between 1920 and 1928 there was a reduction of 18 per cent in the number of railroad employees. This decreased manpower handled a greater volume of traffic, and much more efficiently, in 1928 than in 1920. The aggregate savings to the railroads due to this reduction in employment (not taking into account changes in rates of compensation) amounted to $625,000,000 for the year 1928, compared with 1920. The increased efficiency in the use of fuel has resulted in a total saving of $450,000,000 for the eight-year period ending in 1928. The total saving for the year 1928 compared with 1920, amounted to over $93,000,000.

These figures are given you to show that the railroads have been active in seeking more efficient railroad operation. Their achievements have been substantial in every phase of operation and the sum total of economies are nothing short of amazing.

The shipper has not paid for these economies. The average revenue per ton-mile was at its highest in 1921 at 1.275 cents. In 1928 the average receipts per ton mile were 1.081 cents. Now we know that this reduction is not all caused by the present lower level of freight rates. But, regardless of whether it was caused by such reductions or by fluctuations in the class of traffic, or otherwise, the fact remains that we have this decrease in the unit return. The railroads were earning revenue at the rate of 1.275 cents per ton-mile in 1921. Had they continued to earn at that rate, they would have collected $839,855,000 more in 1928 than they actually did collect.

Without going too far into statistics, it can be clearly demonstrated that the net revenues which the railroads are now receiving are almost entirely due to the economies effected. Had there not been large amounts of capital spent for improving transportation facilities, out of which economies primarily grew, very few railroads today would have any revenue above expenses.

Retirement of Inefficient Equipment

We come now to the main point of this talk. That is, to what source must we look for the greatest possibilities in the further reduction of transportation expenses. We believe that the greatest possibilities for bringing about such reductions are——

1. A continuation of the plan for the retirement of the smaller and less efficient equipment, both motive power and cars;
2. A reduction in the empty car mileage; and
3. Increasing the net load per car.

Here, again, it will be observed readily that responsibility rests upon different shoulders. The continuation of the plan for the retirement of smaller and less efficient equipment, whether of cars or locomotives, is a matter of policy for railroad management. The question of keeping the empty car mileage at a minimum is, likewise, largely a responsibility of railroad operation. Increasing the net load per car, however, can be secured only by the co-operation of shippers.

With respect to the policy of retiring the smaller and inefficient cars, the answer is simple. Take the grain movement which we have in the southwest every year. It is a matter of record that the increased use of the combine-harvester-thresher, plus the marketing methods now in vogue, sends a veritable deluge of grain to primary markets during the months of July and August. Terminal elevators, railroad terminals and everything and everyone involved are taxed to the utmost during the peak movement. Despite this new development the railroads have met the situation without serious difficulty.

I will say to you, without fear of any contradiction whatever, that this sort of a grain movement, if the railroads had owned nothing but 60,000 lb. capacity cars, would have resulted in the worst catastrophe in transportation service that the country had ever witnessed. If we analyze the car ownership of four principal roads serving the southwest wheat belt, we find that 58 percent of their box cars are of the 80,000 lb. capacity type and 29 percent of the 100,000 lb. capacity type. If these roads had had nothing but cars of 60,000 lb. capacity, it would have required an increase of 46 percent in the number of cars in service to have moved the traffic during the past season.

It is not necessary for me to detail here what such an increase in number of cars would have meant in the way of reduced efficiency in train service, in the congestion and blocking of the country elevators, in the accumulation and congestion at primary markets and terminals, as well as in increased expense to the railroads for the maintenance and handling of these additional cars. Something of an idea may be gained from statistics indicating that during August of this year there was a daily average of twenty-four million bushels of wheat on track awaiting unloading at seven primary markets. Had this wheat all been in 60,000 lb. capacity cars and had these cars been loaded to capacity, it would have required 21,800 cars. These cars would have occupied 146 miles of track. The same amount of wheat, however, all loaded in 100,000 lb. capacity cars and these cars loaded to capacity would have required only 12,000 cars. These cars would have occupied only 100 miles of track space.

I am ready to agree that this is only a theoretical example but I will not agree that it does not mean anything. Bluntly stated, it means that every time we take a large car and load it to capacity we are contributing to practically every factor that makes for a continuation of the present efficient and dependable railroad service.

How Increased Loading Can Be Secured

And this brings me directly to the point which I would like to impress most vividly upon you, namely, increasing the net load per car. We have made an estimate that by increasing the load per car one ton there would be added not less than $100,000,000 a year to the net earnings of the railroads. Probably some of you are saying right now—"Fine, but what do we get out of it?"

Take it, then, from an entirely selfish standpoint where you can put your hand on the actual dollar and you will find that by heavier loading you can reduce your expense of handling and your sales cost per unit, you can eliminate demurrage and, in other ways, make sufficient money yourself to justify the practice, regardless of the other things that you will accomplish in the way of making it possible to handle the traffic of the country with less equipment and with more efficiency, thus promoting the greatest possibility of a reduction in transportation costs which, of course, must mean eventually a reduction in the charges for transportation. I have already called your attention to the reduced revenue per freight unit during the past eight years. I have not yet made mention of a far more important benefit of dependable transportation service which has made possible the cutting down of inventories, the easing of money rates, the stabilizing of business and the more rapid movement in the flow of goods from factory to consumer. These effects themselves are worth the price.

Examples of Increased Loading

The question arises, however, can the load per car be increased? I believe that the best way to prove that it can be done is to show what has been done. We have in our files hundreds of examples showing what different firms, and individuals all over the country have done in this matter of heavier loading. These examples run the gamut of all commodities from alfalfa to zinc oxide. I will give you only a few of them, pulled at random from our files.

1. A large manufacturer of foodstuffs in the middle west receiving about 130,000 cars a year, including 44 commodities, by handling with shippers increased loading on 29 of these commodities. Twenty-six of the 29 show increases of five tons per car or more, one being increased 15 tons per car.

2. A large receiver of flour in New England, when interviewed as to heavier loading, promised to handle with shippers. A later check indicated that loadings from one shipper had been increased to 73,500 lb. per car where previous loadings had been 58,980 lb. per car—increase of $41.24 in revenue per car. Another shipper increased loading from 59,200 lb. per car to 74,025—increase of $81.43 in revenue per car.

3. A large baking corporation operating factories in 36 cities agreed to instruct that flour destined to it be loaded 400 barrels to the car instead of 250 and 300 barrels as previously. This concern receives approximately 5,000 cars of this commodity a year.

4. A receiver of gray middlings in the middle west taking about 100 cars a month instructed shippers to increase the loading 100 sacks per car, causing an increase of over five tons per car, which will eliminate handling of 16 cars in a month's business.

5. Seven flour receivers in a Tennessee city had been receiving loads of 250 barrels, 49,350 lb. Upon solicitation they agreed to order cars loaded 350 barrels, 68,950 lb.—increase 9¾ tons per car.

6. A New England contractor holding a contract for a road construction project agreed to increase cement orders from 924 bags, 87,780 lb., to the car to 1,200 bags, 114,000 lb. Increase 13 tons per car.

7. A construction company in South Carolina holding a contract for a project requiring 47,000 barrels of cement, gladly agreed to order in maximum carloads. It said it "had never given the matter any thought in the past."

8. Steam meal destined to a receiver in Tennessee averaged during month of March, 1929, 428 sacks, 43,335 lb. to the car. Upon solicitation loading was increased in the case of burlap sacks to 600; paper sacks, to 500.

9. Bulk corn meal and corn cake moving to receiver in Tennessee had been averaging from 65,000 lb. to 70,000 lb. per car. Upon solicitation, the receiver instructed the shipper to load to full cubical capacity of the car, which gives load of approximately 82,000 lb. Increased revenue per car $25.46.

10. An eastern street railway was receiving bulk salt loaded by contract 22½ tons per car. Upon solicitation, this was increased to 44.3 tons, an increase of 21.8 tons per car. This increase of almost 100 percent eliminates the movement of cars into a section out of which the preponderant movement is empty.

11. A large receiver of sugar in the middle west agreed, upon solicitation, to order in larger carloads. Previous shipments had been moving 600 bags, 60,600 lb. to the car; cars now are loaded 800 bags, 80,800 lb.—increase, 10.1 tons per car.

12. A large shipper of flour in Minnesota, shipping to its own warehouses, was found to be loading 49,350 lb. per car, regardless of the size of car furnished. Upon solicitation, instructions were issued to load in future 89,000 lb. in all 80,000 capacity cars and 110,000 lb. in all 100,000 lb. capacity cars. Under new loading the tonnage will move in less than one-half as many cars as previously.

13. A check in February of coal receipts of a company in Minnesota disclosed an opportunity for increasing the load, and the receiver was solicited. Later check in May indicated average per car had increased 15,412 lb. This eliminated one car of every seven as previously handled, and, as this receiver pays a re-

weighing charge of $2.25 per car, this means a considerable saving to them. Based on a year's business, this increased loading saves $321.75 of re-weighing charges alone.

14. Aluminum ore loadings of a large shipper in Arkansas were found to be running 80,640 lb. to the car. Investigation developed that failure to load heavier was due to inability of its mechanical loader to do so. As a result of solicitation for heavier loading, a change was made in the loading machine, which now enables this shipper to load 89,600 lb. in 80,000 lb. capacity cars and 109,760 lb. in 100,000 lb. capacity cars.

15. A recent check of wheat loadings on one of the large roads serving the winter wheat belt indicated that 18,000 cars of wheat loaded in 1928 averaged 110.9 percent of nominal capacity. The same number of cars in 1929 averaged 112.8 percent in the relation of load to nominal capacity.

The Matter of Increased Carload Minimums

I know that a great many of you have expressed the fear that with the addition of the larger equipment and the elimination of the smaller cars you will be confronted with greatly increased minimums that may prove burdensome to the small shipper and the small dealer. We now want to repeat what we have said a number of times, and that is that the Car Service Division has nothing whatever to do with minimums, never has had and does not want to have, and any action that may be taken by any of the traffic associations is entirely independent of the work of the Car Service Division and is not based upon any of the results that have been accomplished in the way of heavier loading by the co-operative efforts of the shippers with the Car Service Division. You should remember that individual railroad officers are just as independent as individual members of the National Grain Dealers Association. I do not believe that you could say that you control the actions of every member of your association.

The rate association dockets are open to the submission by anyone of a proposal that might include minimums, but the mere fact that it may be placed on the docket does not mean that it is going to be adopted. Several such things have appeared on the dockets within the past few years, but we have no knowledge of any of them ever having been made effective.

We have said nothing about attempting to increase the car load that will not be disposed of by the dealer in three weeks or a month. In reality, minimums are made to take care of that situation. What we ask is that, where shipments are moving in sufficient volume, cars be loaded to their full capacity. We have not done anything or attempted to do anything in the way of soliciting the small dealer whose shipments are very infrequent, to do anything that would interfere with the economical conduct of his business.

We realize that an increase in the capacity utilization of equipment can be best brought about by co-operative action with the shippers on the basis of mutual benefits, and great strides have been made in that direction. To raise minimums as high as they could possibly be raised either by consent of shippers or by the action of regulatory bodies will never produce the desired results. If we were to rely on increased minimums to get us proper utilization of equipment, we would never accomplish anything.

In my judgment, along this line there will be found one of the greatest possibilities for effecting further economies in railroad operation. From every point of view, even on the basis of individual self-interest, efforts here will pay big dividends.

Railroads and National Prosperity

It would be a fine thing in this country if the people engaged in agriculture and all other business could realize that it is not possible to have a prosperous country without prosperous railroads. How many of you know that the railroads use each year 25 per cent of the coal mined in the United States? How many of you know that the railroads consume 30 per cent of all fabricated steel, 25 per cent of all timber cut for commercial purposes and 11 per cent of all petroleum produced in the United States? In 1928 the employees of Class I roads received as compensation the purchasing power of over two billion eight hundred million dollars and the railroads gave the government in the form of taxes $389,000,000.

We can not have a truly prosperous condition unless every factor in the economic situation is prosperous. The whole thing is a constant cycle. To the extent that the railroads cannot buy, to that extent the producers will fail to sell. If the railroads cannot buy coal, steel, lumber or petroleum, the industries producing these things are obviously hurt. If the revenues of the railroads are greatly disturbed, the purchasing power of their employees will be lessened.

Thus it goes all the way down the line. All phases of business, agriculture, mining, industry and trade are inextricably tied into our economic system. There are none which are independent of the rest. Anything that reacts unfavorably on one major industry has a similar effect ultimately on the others.

The reverse is also true. Whatever affects favorably one fundamental industry will find its favorable reaction in the others. It is for this reason that I have been trying to point out to you what shippers may do to aid the carriers in attaining their goal of capacity utilization of railroad equipment. Your efforts along this line will be rewarded not only on the continuation of efficient and dependable transportation service, but will also be amply paid for in direct and tangible returns accounted for by your own cash register.

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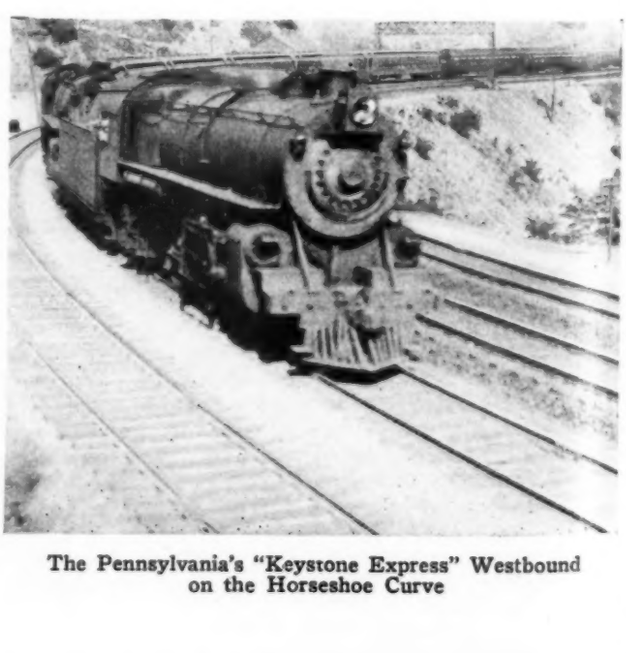
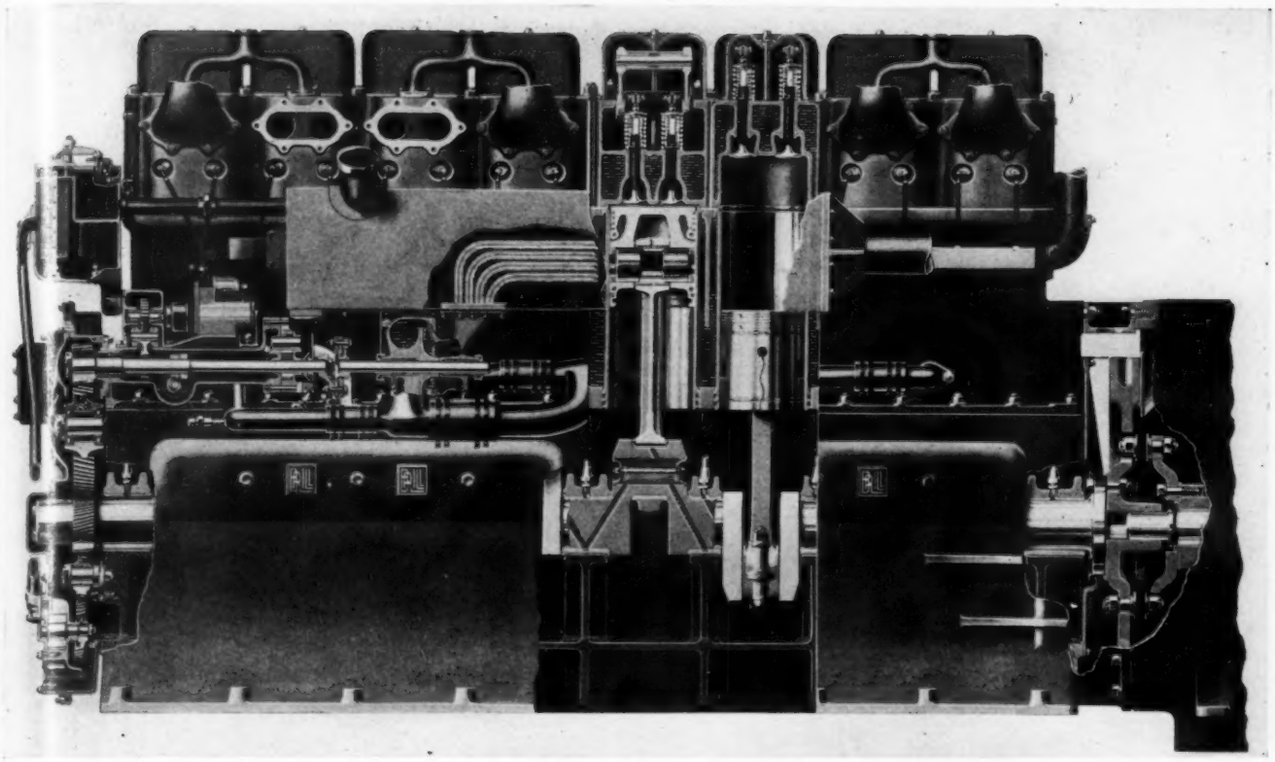


The Pennsylvania's "Keystone Express" Westbound on the Horseshoe Curve



Sectional Elevation of the Eight-Cylinder Engine

Brill Builds Large Rail-Car Power Plants

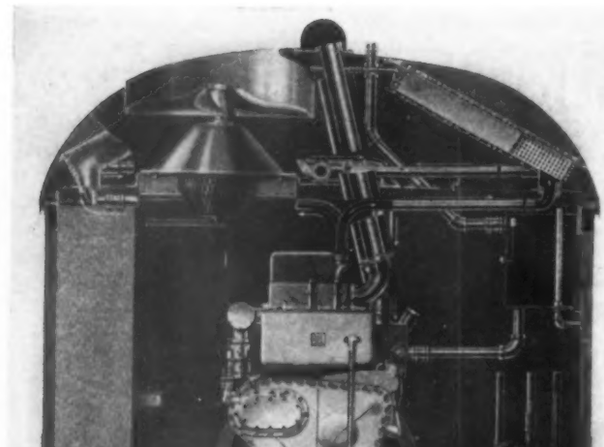
Engines develop 400 hp. and 535 hp., respectively— Engine governor controls generator field

THE J. G. Brill Company, Philadelphia, has developed and is now offering for sale two completely new power plants, one rated at 400 hp. and the other at 535 hp. The engines are of identical design and size, except that the smaller one is a six-cylinder unit and the larger an eight-cylinder in-line unit. Likewise, the electrical equipment, which has been specially designed to operate with these engines in co-operation with the engineers of the General Electric Company and the Westinghouse Electric & Manufacturing Company, is identical as to type, control arrangements, etc., for both engines, differing only in size. The eight-cylinder equipment will, therefore, be illustrated and described, it being understood that differences are only those which might be expected by reason of the lesser number of cylinders in the smaller plant and the difference in size of transmission equipment, radiators, fuel tanks, etc., to correspond with the smaller horsepower.

In addition to the main engine, a small automotive-type four-cylinder engine of 15 hp. capacity is used to drive a 32-40-volt generator, having a continuous rating of 7.5 kw., for battery charging, excitation, lights, air-compressor operation, etc. When considering the complete car, therefore, the actual horsepower installed is, respectively, 415 and 550.

The main engines have been completely designed by the Brill organization and embody all the well-known features characteristic of previous Brill engines and in addition numerous developments and improvements which are the result of experience in the field. They are of 8-¾ in. bore, 10-½ in. stroke, designed for a normal speed of 950 r.p.m.; the piston displacement of the six is 3,788 cu. in., while that of the eight is 5,051 cu. in. These engines weigh respectively 8,000 and 10,000 lb. The rated horsepower represents a brake mean effective pressure of about 87 lb., which is well below the maximum that can be obtained. It is expected that new engines on test will develop at least 10 per cent above the rated power. This follows previous Brill practice, and as a result of this de-rating, it is expected that these engines can be operated at full rated horsepower whenever desired throughout their life.

The base is an internally-ribbed aluminum alloy casting, in one piece, and combines what would ordinarily be



Diagrammatic Illustration of the Cooling System

known as the crankcase, oil pan and bedplate, extending from the flange on which the engine is mounted to the bottom of the cylinder block. The crankshaft is supported in this base and can be removed through the top by removing the cylinder block and end covers. This base also carries an integral semi-bell housing at the rear end, to which the electric generator is attached. The generator is driven by the engine through a flexible steel-disc coupling. The forward end of the armature shaft is piloted in the flywheel, the generator being of the single bearing type. The cylinder block, which is also in one piece, bolts to the top of the base and when in place gives a combined depth of 52 in., these two parts together forming an extremely rigid and substantial support for the crankshaft.

The cylinder liners are of the removable type and are of nickel-chrome cast iron, heat-treated, machined all over and ground to size. Two rubber seal rings are used around the bottom of the sleeve to prevent water leaks.

The cylinder heads, which are cast as individual units, one per cylinder, include a novel combustion chamber and valve arrangement, for which patent application is pending. As in previous Brill engines, two intake and two exhaust valves are used. Four relatively small valves are used per cylinder in preference to two large valves. Past experience has demonstrated that in engines of large size, seat and valve life are more than doubled in this way.

The head is so designed that the combustion chamber is concentrated on one side under the exhaust valves, while the other side of the head, which includes intake valves, has a very limited clearance over the top of the piston. It is expected that this head will materially reduce the tendency to detonation, give improved efficiency, reduce the fuel consumption, eliminate slow burning or after burning of the fuel, and will decrease the amount of spark advance necessary. It also makes possible satisfactory ignition with two plugs, whereas three or four have heretofore been found necessary, even in engines of somewhat smaller size. The cylinder heads are completely interchangeable.

The pistons are of the Butler patented constant-clearance nickel-aluminum type.

The crankshaft is a high-carbon hammered forging, fully heat treated, machined all over, and balanced. All main bearings are 5¼ in. in diameter, all crank-pin bearings 5 in. in diameter and the cheeks are 2-⅛ in. by 6-½ in. The front and center bearings are 5 in. long, the rear bearing 6 in., and all other main bearings 3-½ in. The connecting-rod bearings are 3-⅝ in. long. The bearing construction is such that it is possible to remove any bearing without disturbing the crankshaft, and that dowels are not required. This is expected to result in a marked improvement in bearing life. The connecting rods are of high-carbon, heat-treated, drop-forged steel, of I-beam section. They are bushed at the upper end for 3-½ in. diameter piston pins of the conventional tubular design.

The valve arrangement makes it possible to operate both intake and exhaust valves from a single camshaft having nine main bearings, which is located at the base of the cylinder block. Each cam, through a rocker-type follower, operates a tubular push rod, which is fitted to a suitable rocker arm located on the cylinder head. A small spring is provided between the rocker-type cam follower and a collar on the push rod, so that all clearance is concentrated at this point, materially reducing valve noise. The camshaft is mounted in a tunnel or trough, so arranged that the cams continually dip in oil.

Ignition is provided by two independent, interchangeable, high-tension Scintilla magnetos, each fitted with an impulse coupling. Four 2-½ in. carburetors are used, opening into the intake manifold located on the right side of the engine, while the exhaust is handled through eight independent vertical exhaust pipes discharging into a muffler built on the roof. It is believed that the use of a separate exhaust stack for each cylinder is a distinct advantage. Rail-car engines, particularly in these larger sizes, operate at a high power factor and where two or more cylinders are served by the same exhaust manifold, it is very difficult to avoid trouble with manifold castings, gaskets and joints.

The oiling system, while generally similar to that used in previous Brill designs, represents a development. Oil is carried in a 30-gallon tank mounted on the exhaust side of the engine above the water and oil-pressure pumps. Oil is drawn from this tank through the gear-type pressure pump, whence it is delivered to an oil manifold. From this the oil is fed to every alternate main bearing. The crankshaft is completely drilled for oil passage from end to end. Connections are taken from the remaining main bearings to a low pressure manifold running the length of the engine beneath the camshaft. From this manifold the oil is fed by suitable passages to the camshaft bearings, thence through copper tubing and connections to the rocker-arm mechanism on the cylinder heads. Cylinder walls and wrist pins are lubricated by spray from the main and connecting rod bearings. The crank pins are drilled, giving a 2-in. diameter reservoir in each crank pin. This reservoir is useful in starting a cold engine, in that oil is immediately available at the bearings without waiting for pump pressure to build up. Oil then drains to the sump, whence it flows to the bot-

tom of the gear case at the front of the engine and is picked up by a scavenger pump, which delivers it to the Hall-Winslow type filter built into the engine, thence back to the storage tank.

The cooling system is generally similar to that used in recent Brill designs, and is so arranged that whenever the engine is shut down the water is drained inside the car, leaving the radiators dry and thus preventing freezing. With the engine not running, surplus water is accumulated in the expansion tank. When the engine is running this water is drawn by the pump through the oil cooler in the oil tank and delivered to the engine, thence to the cross-flow radiators located in the roof, from which it returns to the suction side of the pump.

The water pump has a capacity at the rated speed of the engine of 240 gallons per minute.

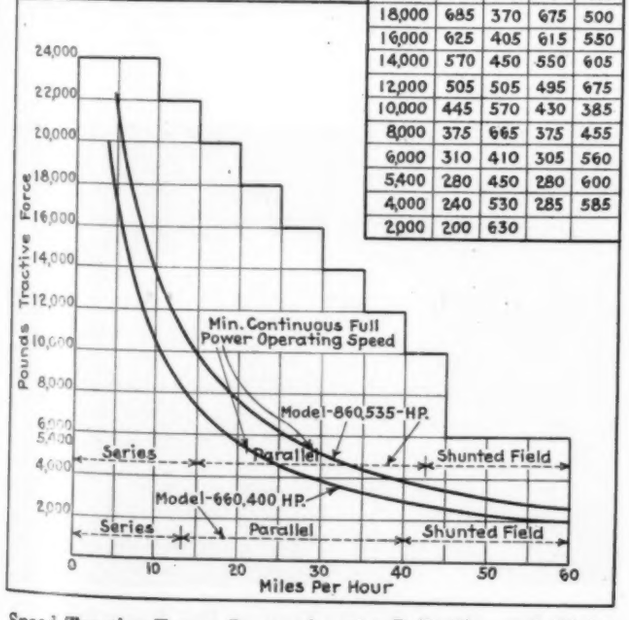
Air is drawn through the radiators by two electrically driven constant-lead cast-aluminum fans 40 in. in diameter. The cooling system is so designed as to give satisfactory cooling regardless of speed or direction of car movement or prevailing direction of the wind. The partial vacuum created between the radiators and the fan causes air to be drawn from the engineroom through the shrouds surrounding the exhaust pipes, thus providing for engineroom ventilation and also cooling the exhaust pipes. The air from the fans is discharged vertically immediately back of the muffler, so that the exhaust gases are carried into the air, thus preventing their reaching the interior of the car body.

The fuel is carried in suitable tanks beneath the car, from which it is fed by vacuum tanks operated by a vacuum pump, driven from the main engine. These vacuum tanks are in duplicate to prevent tie-up of the equipment in case of failure of either tank.

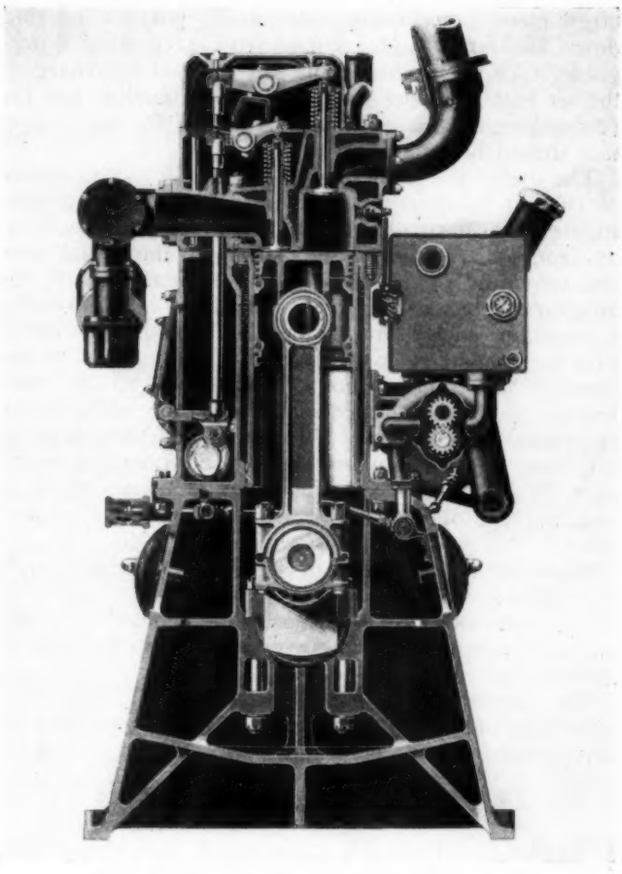
A variable speed governor is provided. The hand throttle at the operator's position controls the maximum opening of the carburetor throttle, in addition to controlling the operating speed of the engine through the governor. This governor, in turn, through an oil relay operates a rheostat or controller in the field

Engine Model	No. 660	No. 860
Horsepower	400	535
Gear Ratio	56-20	56-20
Wheel Diam.	36 in.	36 in.

Tractive Force	400 HP. Amps.	400 HP. Volts	535 HP. Amps.	535 HP. Volts
22,000			780	430
20,000	740	345	725	465
18,000	685	370	675	500
16,000	625	405	615	550
14,000	570	450	550	605
12,000	505	505	495	675
10,000	445	570	430	385
8,000	375	665	375	455
6,000	310	410	305	560
5,400	280	450	280	600
4,000	240	530	285	585
2,000	200	630		



Speed-Tractive-Force Curves for the Brill Six- and Eight-Cylinder Engines



Cross-Section of the Brill Rail-Car Engine

of the generator in such a way that if the engine speed rises the load is increased and vice versa. Thus it is possible, for any desired engine operating speed, to get the best combination of throttle opening and load consistent with smooth operation of the engine and maximum fuel economy. This feature is also the subject of a patent application.

The electrical equipment consists of two groups. The high-voltage or 600-volt group consists of a shunt-wound generator driven by the main engine, with the field regulated by the governor, suitable traction motors and control apparatus, consisting of a small master controller which governs motor connections, i. e., forward or reverse, and series, parallel or shunt-field arrangement of traction motors, together with the necessary switches and contactors. The fan motors and a 25-cu. ft. high-voltage air compressor are included in this group. There is no exciter attached to the main generator.

The low-voltage group consists of a small four-cylinder automotive-type industrial engine, which drives a 32-40-volt generator mounted as a unit with it, the 32-volt battery, a 25 cu. ft. 32-volt air compressor, and the necessary apparatus for control. The field of this generator is varied by a Safety Car Heating & Lighting Company's generator regulator, so as to maintain the voltage of the small set substantially constant. This insures charging the battery at the proper rate regardless of its condition, in addition to carrying compressor, lights, or other 32-volt loads, as necessary, without any danger of over-charging the battery. It is believed that this arrangement will contribute materially to the reliability of the apparatus and particularly to the life of the battery. Furthermore, this small set can be operated at any time, whether or not the

large plant is operating, making it possible to shut down the large engine completely in coasting downgrade. Also the small plant can be used for charging the air system before starting the main engine, and for re-charging the batteries at terminals if for any reason this should become necessary.

The use of the small engine provides a second source of current for starting the main engine, i. e., the main engine can normally be started from the battery, or from the auxiliary set, although the usual procedure would be to draw from the battery with the auxiliary set assisting. The small set also provides a constant source of air without making it necessary for the operator, in descending long grades, to disconnect the traction motors and speed up the main engine, as has been necessary with the conventional equipments heretofore. The small auxiliary set also improves the economy, as the fuel consumption necessary for handling accessories is far less than would be required for operating the main engine for that purpose.

Since the load on the main engine is determined purely by engine speed and not by any limitations of electrical design within the usual car speeds, it is possible to utilize the full power of the engine at car speeds up to 60 miles an hour.

The curves illustrate the speed-tractive force characteristics of both the six-cylinder and the eight-cylinder engines.

Electrically-Operated Locomotive Mover

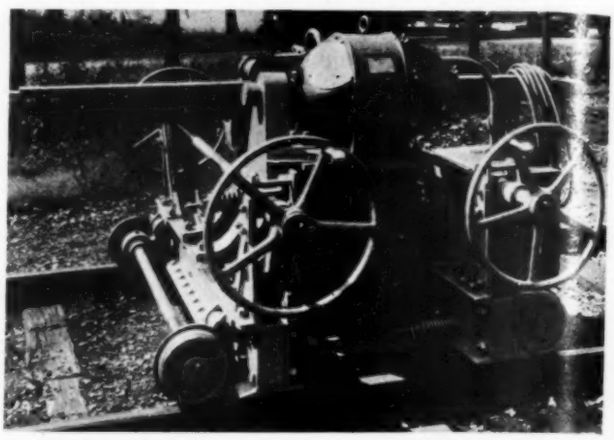
THE need of an improved method of moving dead locomotives has long been felt in enginehouses and repair shops, the use of shop switchers not only tying up locomotives but impeding the turntable service and the work of the transfer table in the back shop.

To overcome this difficulty, the Whiting Corporation, Harvey, Ill., has developed an electric locomotive mover, designed to save time and labor in moving dead locomotives. This patented machine consists of a steel structure 3 ft. in height mounted on four flanged wheels equipped with roller bearings, the wheels being spaced for standard gage track. The entire truck is less than 5 ft. in length and can be easily moved by one man on the track. The mover can be lifted from track to track with a crane by an eye in the center of its top.

A 5-hp. motor mounted on the truck drives a horizontal beam through a series of gears at a rate of 5 ft. per min. with ample power to push or pull any locomotive from the smallest type to the heaviest Mallet. The beam is furnished in any length required. A special coupler fitted at either end of the beam may be attached to either the knuckle pin or the drawbar pin of the dead locomotive. When the beam is in its normal position, its coupler height meets A.R.A. requirements. The beam is adjustable, however, by means of regulating springs, to any desired coupler height.

When a locomotive is to be moved, the mover is first locked to the rails by means of clamps, one for each wheel, gripping beneath the ball of the rail and drawing the truck frame downward until its serrated steel blocks grip the top of the rail. The hand wheels, two on either side of the truck, work the clamping mechanism. A spin of the wheel completes a solid anchorage.

The motor, operated by push-button control, pushes or pulls the beam to the locomotive. After coupling, the operator stands beside the locomotive and controls the spotting as the locomotive is pulled or pushed along. Precise control makes it possible to spot the locomotive on the dot. If, at the end of the beam's travel,



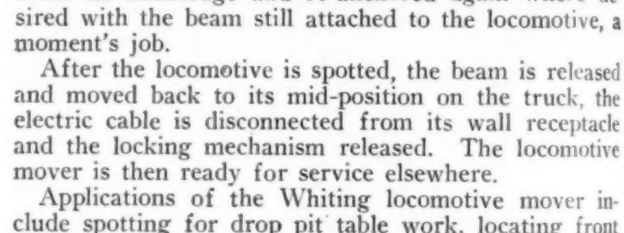
Whiting Electrically-Operated Locomotive Mover from the Motor Side

a greater movement is desired, the mover is released from its anchorage and re-anchored again where desired with the beam still attached to the locomotive, a moment's job.

After the locomotive is spotted, the beam is released and moved back to its mid-position on the truck, the electric cable is disconnected from its wall receptacle and the locking mechanism released. The locomotive mover is then ready for service elsewhere.

Applications of the Whiting locomotive mover include spotting for drop pit table work, locating front and back dead centers in setting valves, running engines over for squaring up valves, getting crank pins on the bottom quarter for applying and removing side rods; spotting front wheels and crosshead for application and removal of wrist pin (crosshead pin), spotting shop engines to relieve interference, placing locomotives under smoke jacks, connecting the locomotive tender to its locomotive and other spotting operation or change of position.

* * *



A New Haven Freight Train at Fall River, Mass.

The Railroads and Reclamation

Recovery of discarded material pictured as large field of economy if properly controlled

By J. G. Stuart*

General Storekeeper, Chicago, Burlington & Quincy, Chicago

Cutting Scrap into Shorts for Bolts at Eola

IT is doubtful if there ever was a time when economy and efficiency have been stressed more than at present. One form of economy which brings exceptional results on a railroad is reclamation. Reclamation is not new. It has been practiced to some extent as long as the railroads have existed. It has kept advancing, but its possibilities have never become exhausted.

There are two forms of reclamation—local and centralized. Both should be followed. Local reclamation really begins with the man using the material. He should be taught to keep good material out of the scrap. What is kept out of the scrap does not need to be reclaimed. When good articles get into the scrap, they should be recovered locally. However, local reclamation should be limited to material that is actually needed locally and to quantities that will be used within a comparatively short time and a check should be made to assure that similar material is not available elsewhere.

Where reclamation involves mechanical work, centralization will produce better results than can be obtained by localized operations. Larger quantities are available. Machines can be worked to better advantage and men can be trained to do special work. In many cases the volume is such that one or more men can be constantly employed at work on the same kind of material, and piece work can be followed.

The centralized plant should be located at the general scrap dock, and the general scrap dock should be located where scrap can be marketed with the least haul. It is a good plan, where possible, to locate the reclamation plant at the same point as the general store. The general store distributes material to all points on the line and the reclaimed material can be handled through the general store with less handling and prompter movement than where the reclamation plant and the store are separated any great distance. To separate the scrap dock from the reclamation plant means that a great many opportunities for reclaimed items will be lost. Scrap handlers either will save material which the reclamation plant will throw back into the scrap because it cannot be used, or they will fail to pick out a lot of material which could be used.

J. G. Stuart

The Stores Should Handle Reclamation

The reclamation plant, as well as the scrap dock, should be operated by the store department, not because that department can do better work, but because the records of the store department constantly keep foremost the requirements of the whole railroad. Other departments reclaim material very largely with their own needs in mind. The store department reclaims with the needs of the system in mind. The store department realizes much better than the other departments the possibilities of using material in the department which released it, or for a different purpose in other departments.

In establishing a reclamation plant, it is often thought that any kind of equipment will be good enough. This idea should be abandoned. Machinery that is unfit for use in other departments is seldom the proper equipment for a reclamation plant. In some cases, the difference between the cost of the new material and the scrap value, plus the labor cost of reclaiming, may be small and the difference in the cost of doing it with poor machinery and efficient machinery will decide whether the material can be reclaimed at a profit. If all the reclamation for a large system is centralized, the volume of such reclamation is often sufficient to warrant installing special machinery. There are instances where home-made machines may do certain work as good or even better than a new machine. In such cases, the home-made machine should be used. There are other cases where the amount of work is too small to justify a special machine, but wherever the savings are large enough to make a machine pay for itself, it is generally best to provide a new machine. In the long run, the efficient machine will give the best results.

For a long time reclamation was looked

* An address before the Western Railway Club, Chicago, on October 21.

Scrapped Car Parts

upon as a side issue; something that could be done by anyone who was not very well fitted to do anything else. This is a mistaken idea. Those who have studied the work thoroughly are convinced that reclamation is a highly specialized business and the railroads that accept this view are the ones that are getting the greatest return from reclamation.

Mechanical skill is required, but an ingenious man with mechanical skill is required. When the scrap is received, the man in charge should save all the material which, in his opinion, can be reclaimed, and for which he thinks there will be a need later on. A great deal of this will be recovered without expending labor.

Cave in Ordering Reclamation

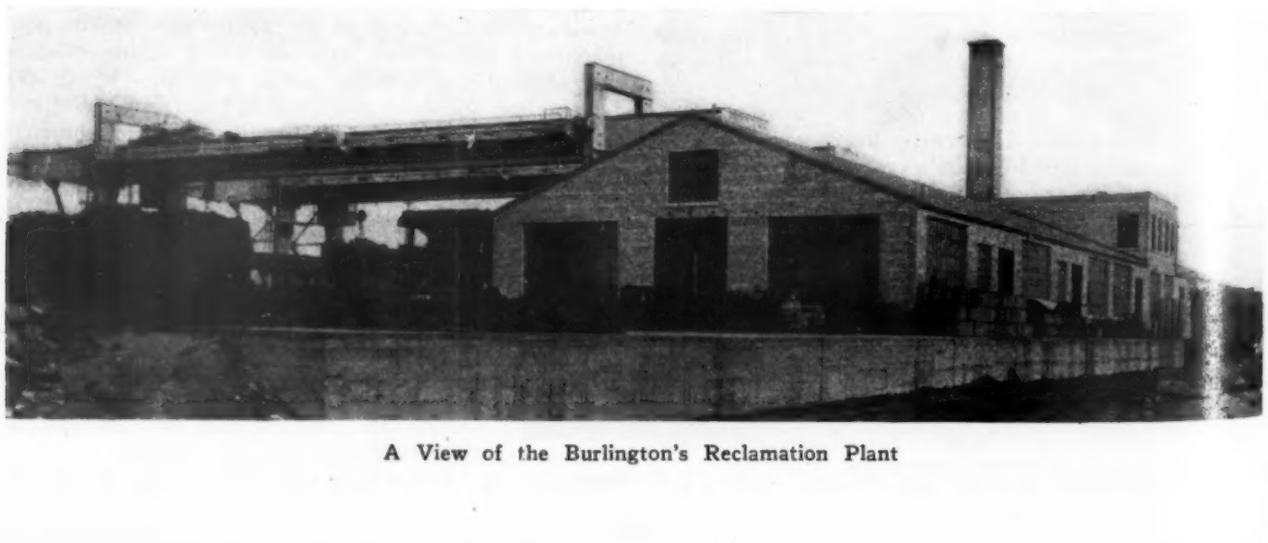
It should be understood, however, that no material requiring the expenditure of labor should be reclaimed until a proper order has been received. This order from the store should be made out with the same care and the same checking that would be made if the item were purchased. An order to reclaim or an order to purchase means exactly the same thing,—that money is to be spent. No money should be spent until there is a place where the material can be used. The man in charge of a reclamation plant should realize fully that he is primarily employed to serve the railroad and not to make a record for himself. He must understand when he spends money to reclaim material that is not needed, he is in exactly the same class with the man who purchases an article that is not needed. To reclaim material in advance of its need is always dangerous for, to some extent, material that is reaching the scrap pile is material from equipment that is being dismantled or at least from equipment that has been in service for a considerable time, and is going out of service.

Quality Important

There are two outstanding requirements in reclamation work. One is quality and the other is cost. Quality should come first, for if the quality is not good, the saving is questionable. Proper equipment should be

Reclaimed by Welding

furnished and then reliable men assigned, so that all material that is turned out will be properly tested and inspected. A brake beam should be given the A.R.A.



A View of the Burlington's Reclamation Plant

load test. Angle cocks should be tested for air leaks, and where material is threaded, standard ring gages or standard plug gages should be constantly used. Where track tools are repaired, facilities should be provided for heat-treating and for checking the hardness. Switch stands, switch rods or frogs and switches should be properly checked by the engineering department.

Engineers of tests should visit the plant and inspect the work in the same manner as if the material was purchased. No material should be issued from the reclamation plant unless it meets the requirements put forth by the mechanical department and the engineering department on material to be used by them.

There may be a tendency to keep the using departments away from the reclamation plant for fear they may find fault and criticize. The air brake inspector, boiler inspector, signal engineer, construction engineers, roadmasters, and car repair foremen should be among the visitors at such plants.

There is to some extent, at least, a prejudice in using second-hand material. Efforts should be made to get users to use the second-hand and reclaimed material. The slogan of every reclamation plant should be "Reclaimed material must not only be good—it must look good."

True Costs Required

The cost of reclaiming material must be kept as low as possible. The real reclamation man is the one who can resist the temptation of large profits and get at the real truth so that when he gives out the cost of reclaiming an article it will be the actual cost. The cost, moreover, should be known before reclaiming in quantity. It is too late to learn after a lot of material has been made at excessive cost.

It is generally accepted that a reclaimed article is not as good as a new article. Even though it may take the place of a new article and dispenses with the purchase of a new article, it is not as good as a new article, and in making up the list of items to be reclaimed, this should be taken into consideration. As a general rule when a reclaimed article costs 60 per cent of what the same article would cost new, a check should be made before adopting the article as a standard item of reclamation.

Centralized scrap docks and reclamation plants may be used as proving grounds. Large quantities of certain items in the scrap may reveal breakage in the same place. Such weaknesses should be called to the attention of those having this work in charge so that the design or pattern may be changed. A great number of weaknesses will also prove to be manufacturer's defects, justifying replacement by manufacturers free-of-charge. The disclosures also give the manufacturer a chance to investigate his designs.

For many years reclamation work was confined largely to material used by the mechanical department. Reclamation now has been spread to the point where work for every department is being done. Oil reclamation is being developed. The signal work opens a profitable field for reclamation. Lumber has become expensive and a use for practically all lumber that is released may be found. The same is true of track material.

What Should be Reclaimed?

The question is naturally asked, "What items should be reclaimed?" The list would fill a book. In a general way, however, every railroad must develop its own list. The lists will differ on different railroads, according to the needs of the railroads and the material that is available for reclamation. The work is also dependent, to a great extent, moreover, on the willingness of the using departments to cooperate with the reclamation department. It will also depend on the interest that is taken by the higher officers in getting reclaimed material into use. If there is a definite desire on the part of the higher officers to use reclaimed material, there will be a corresponding interest and willingness on the part of the subordinate officers and workmen.

Under the Big Crane in the Burlington's Scrap Yard, Where Reclamation Starts

We have passed the stage where rethreading a bolt and retapping a nut is really considered reclamation. Reclamation now begins where we are able to take an item which is being sold as scrap and bring it back to usefulness,—to take an item that in its present condition is useless and bring it back to an item for which there is a need. A track chisel that is worn beyond the limits of use as a chisel can be made into a rivet breaker, or a chisel for an air tool because of the quality of the steel in it. A spike maul that has served its life, can be made into an excellent coal pick or track punch. Rods and bars removed from cars can be reformed into many different kinds of car forgings.

Scrap boiler tubes appear to be about as useless as any kind of scrap. Yet so many uses have been found for them in making right-of-way gates, roadway signs, fence posts, cattle guards, threshold plates and miscel-

laneous forgings, that we are now using all of the scrap flues that accumulate. Air reservoirs removed from engines and cars, make excellent gasoline storage tanks for section use, on the Burlington, we never get enought to meet the demands. On account of the heavier material of which they are made, they are particularly good for underground storage. Scrap coil springs can be drawn out and made into packing knives, packing hooks, jimmy bars and several other kinds of bars.

Scrap angle irons removed from coal cars can be made into carrier irons, brake beam safety angles, many different forgings and also for the frame-work for small and medium size buildings. Even scrap front end netting can be used on motor car tops, blow-off boxes and tops of tables for sorting nuts and washers. Scrap wrought pipe can be made into motor car safety rails and ferrules for insertion in concrete products. Scrap arch bars and transoms can be made into journal box tie bars, draft gear follower supports, buffer plates, and, by hammering out into bars, into many kinds of forgings, including switch rods. Old telegraph cross-arms can be used to good advantage in small buildings. Tie plates can be repunched and used with lighter rail. Rail joint springs that have lost their elasticity can be reset and put into service.

There is no end to the possibilities of reclamation. If we look back a few years and compare what we are reclaiming now with what we reclaimed then, we will be surprised at the number of items that we have found that are reclaimable. There is no good reason to think that we have reached the end. There is just as much reason to feel that a few years from now, we will be reclaiming hundreds of items which today seem to us impossible to use. The best way to know what we should reclaim is to see what we are selling for scrap. So long as we are selling scrap material at from $8 to $15 per ton and buying new material at three to ten times that value, there will be additional opportunities for reclamation.

Canadian National Buys 20 Eight-Wheel Switchers

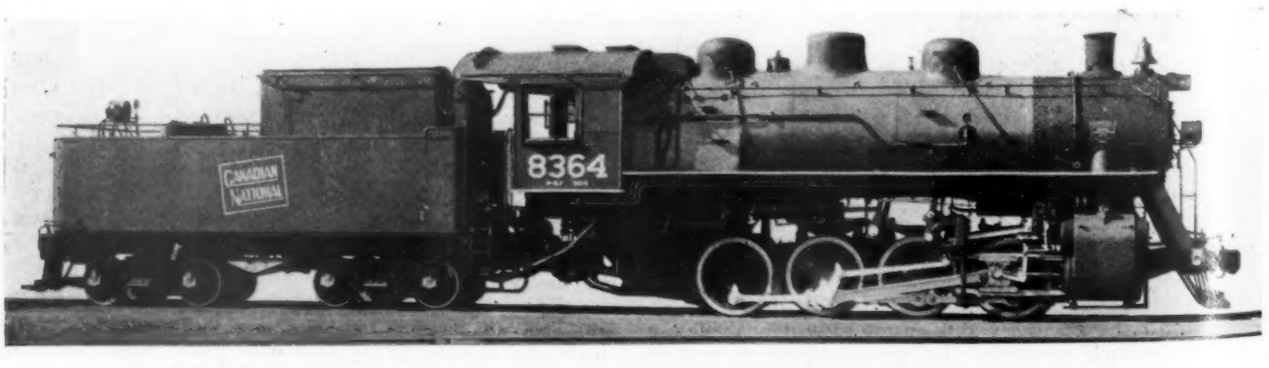
TWENTY eight-wheel switchers were recently delivered to the Canadian National, ten of which were built by the Canadian Locomotive Company and ten by the Montreal Locomotive Works, Ltd. All of the 20 locomotives are identical in design, with the exception of a few special appliances. They develop a tractive force of 49,690 lb. The driving wheels are 51 in. in diameter, and the cylinders are 22 in. in diameter by 28 in. stroke. The boiler operates at a pressure of 220 lb. The total weight carried on the drivers is 217,700 lb. Other dimensions, weights and proportions are shown in the table.

All of the locomotives are equipped with Type A superheaters, cast steel grates and fire-fighting appliances. The main driving boxes are of the floating-bushing type, while the other driving boxes are of the conventional design, of cast steel with bronze liners cast on the shoe and wedge faces. The locomotives built by the Canadian Locomotive Company are equipped with Ragonnet reverse gears, while those built by the Montreal Locomotive Works, Ltd., are equipped with Alco reverse gears. All have Baker valve gears.

Table of Dimensions, Weights and Proportions of the Canadian National Eight-Wheel Switchers

Railroad	Canadian National
Builders	Canadian Locomotive Company Montreal Locomotive Works, Ltd.
Service	Switching
Cylinders, diameter and stroke	22 in. by 28 in.
Valve gear, type	Baker
Valves, piston type, size	12 in.
Weights in working order:	
On drivers	217,700 lb.
Total engine	217,700 lb.
Tender	147,400 lb.
Total engine and tender	365,100 lb.
Wheel bases:	
Driving	14 ft. 6 in.
Total engine and tender	51 ft. 1 in.
Driving wheels, diameter, outside tires	51 in.
Boiler:	
Type	Straight top
Steam pressure	220 lb.
Fuel	Soft coal
Diameter, first ring, inside	73 in.
Firebox, length and width	96 in. by 75¼ in.
Tubes, number and diameter	192—2 in.
Flues, number and diameter	32—5½ in.
Length over tube sheets	14 ft. 9 in.
Grate area	50 sq. ft.
Heating surfaces:	
Firebox	164 sq. ft.
Arch tubes	27 sq. ft.
Tubes and flues	2,148.6 sq. ft.
Total evaporative	2,339.6 sq. ft.
Superheating	540.0 sq. ft.
Combined evaporative and superheating	2,879.6 sq. ft.
Tender:	
Water capacity	6,700 Imp. gal. (7,902 U. S. gal.)
Fuel capacity	11 tons
Maximum tractive force	49,690 lb.
Maximum curve	18 deg.
Weight proportions:	
Weight on drivers ÷ tractive force	4.38
Total weight engine ÷ comb. heating surface	75.9
Boiler proportions:	
Tractive force ÷ comb. heating surface	17.25
Tractive force × diam. drivers ÷ comb. heat. surface	882
Firebox heat. surface ÷ grate area	3.82
Firebox heat. surface, per cent of evap. heat. surface	8.18

The tenders have a water capacity of 6,700 Imp. gal. (7,902 U. S. gal.) and 11 tons of coal. They are equipped with Commonwealth cast steel tender frames, and Symington tender-truck side frames with detachable boxes. The draw casting and short shank coupler attached at the rear of the tender are the same as used on the front end of the locomotive.



Eight-Wheel Switcher Built for the Canadian National by the Montreal Locomotive Works, Ltd.

One of the Industries Treated by the Department

How the Cotton Belt Attracts New Industries

Railroad arranges for the construction and leasing of factory buildings

DURING 1927 and 1928 the St. Louis Southwestern, through the medium of its industrial department, located 234 new industries along its 1,784 miles of lines in Missouri, Arkansas, Louisiana and Texas. One hundred and nine of these plants were located in 1927 and 125 in 1928. The industries that in 1928 selected sites along the Cotton Belt lines are expected to produce approximately 25,000 cars of freight annually, representing more than $1,000,000 in freight revenue. To yield this tonnage it is estimated that the 125 industries have invested about $7,000,000 of capital in equipment and facilities.

Constructing New Buildings for Leasing

One of the novel methods that has been used to attract industries to Cotton Belt locations is a service in negotiating the financing and construction of buildings and warehouses. In it the railroad follows the procedure of submitting locations adjacent to the right of way to a prospective industry, advising it that the railroad is in a position to arrange for the construction of a building on a long term lease basis. In the event that the industry selects a site and prefers to lease a building, negotiations are begun with the owner of the land.

When the property owner is financially unable to construct the necessary building or buildings, the railroad interests a third party in financing the construction of the facilities and, through real estate connections, they are leased to the industry. The outside agencies used by the railroad in providing such a service to industries consist of several financial institutions, a real estate firm, an architect who prepares the building plans and a contractor who estimates the cost of the structures.

A disinclination of industries establishing distributing branches and warehouses to make capital investments, which has become pronounced within the past few years, led to the creation of this service. In most cases the leases extend over a period of 10 or 20 years.

A Survey of Available Sites Essential

This plan was predicated upon a survey of the available undeveloped property in the major industrial centers. Each land owner was asked to agree to subdivide his property, to protect the railroad in its future industrial development, with the ultimate object of having him either dispose of it to industries which might desire to purchase a site and erect their own facilities, or to construct buildings and lease them and the ground they occupy for a term of years. Where owners of acreage are financially unable to subdivide it, the railroad exerts every effort possible to see that it passes into the hands of some individual or organization which is in a position to prepare it for industrial use.

The survey of undeveloped property in turn presupposes the existence of a general survey of the natural, industrial, agricultural and economic resources of the territory traversed by the railroad's lines. In 1927 the St. Louis Southwestern undertook such a survey and the results were compiled in pamphlet form and distri-

Many Companies Utilize Leasing Facilities

buted among prospective industries and local chambers of commerce. These surveys were designed to provide an industry with a general idea of conditions in specific communities in which it might be interested.

The general prospectus divided the railway's lines into five sections—Southeast Missouri, Northeast Arkansas, Southwest Arkansas, Northern Louisiana and Texas. For each section all pertinent facts regarding present and future development were set forth and summarized in this manner:

Resources

Clay	Oil and gas
Timber	Sand and gravel
Lignite	Iron ore
	Limestone

Prospective Industrial Development

Brick and tile plants	Paper mills
Saw and planing mills	Lignite mines
Woodworking plants	Textile mills
Sand and gravel pits	Refineries
Fertilizer plants	Acid Plants
Blast furnaces	Cement plants
Steel Fabricating plants	Foundries

The Surveys of Specific Locations

While the compilation of data for the preparation of an industrial survey has as its predominating object the determination of the location and extent of all undeveloped resources, numerous other vital features enter into consideration. Among them are the availability and adaptability of labor necessary for the operation of an industrial plant in the development of the resources; water, power and fuel supply; proximity of transportation facilities, advantages or disadvantages of the proposed industrial plant in its location to consuming markets as compared with existing plants engaged in the same pursuit; the saving in production costs when compared with some other locality in which competitors are operating, and the local market which would be created by the establishment of a plant at a particular point by excluding the products of competitors. In addition to answering these questions, which are of the utmost importance to a prospective enterprise, the industrial survey constitutes a vivid portrayal of a community, indicating its size, activities, social, labor and economic conditions, form of government, rate of taxes and numerous other details which will be a determining factor in indicating actual conditions. From the general study individual surveys covering every community served by the Cotton Belt were prepared in the manner indicated and issued in pamphlet form on January, 1928.

Where the character and importance of the industry and the size of the proposed plant justify the work and expense involved, the Cotton Belt makes a practice of preparing a detailed comprehensive engineering report. A typical report of this kind would be titled "Isington, Texas, as a Location for the Blank & Blank Company," It would include all the features covered in the pamphlet survey and additional detailed material. All data would be presented in its relation to the operations of the industry involved.

Scope of Engineering Report

The engineering report defines the territories served by the industry's present and future facilities and the relation of the freight rate structure to each. Statistics are presented to indicate the existence of a desirable market and figures furnished indicating the unit cost of factors entering into the production of the specific commodity or commodities at the proposed plant location.

Such additional data as meteorological facts, population trends, a complete list of industries now situated in the proposed location, living costs, material costs, industrial insurance rates, fire and police protection, freight rates and rail distances are shown in the engineering report. These are accompanied by suitable charts and maps. With answers to specific questions that might have been asked, every conceivable bit of information that would be useful to the prospective user of an industrial site is provided.

Noteworthy among the industries located by the Cotton Belt during the two year period 1927 and 1928 are a paper and pulp mill, bag plant and a cement plant, representing an investment of approximately $9,500,000, which will yield several thousand cars in freight tonnage annually. As an example of the diversification of the

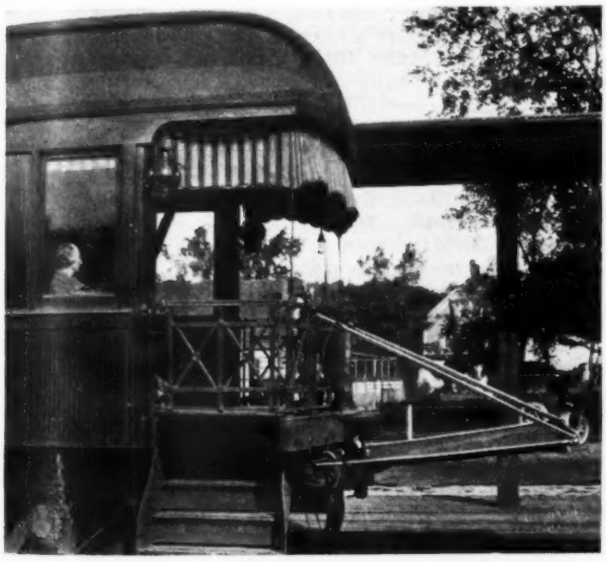
A Bag Manufacturing Plant is Established

new industries in this railroad's territory an analysis of the individual plants shows that they fall into 55 different general classifications, according to the kind of product handled.

Industries which have taken advantage of the Cotton Belt's service by leasing facilities include a manufacturer of plumbing supplies who desired a distributing warehouse, a bag manufacturer, a distributor of radios, a furniture manufacturer, a can manufacturer, three rubber products manufacturers, a paper manufacturer and a seed company. The selection of sites on the St. Louis Southwestern by a number of companies has been the result of the trend of manufacturing industries utilizing timber for their raw material to establish plants in the Southwest. It was displayed noticeably through the location of such industries as an automobile body plant and a furniture factory.

Dust Screen for Fast Trains

THE Dominion Atlantic Railway, on its two through express trains between Yarmouth, N. S., and Halifax, has, during the past summer, used at the rear of the train a canvas screen, supported on iron pipe, which is called a dust catcher. The device is attached to the rear of the observation car, about



Dust Screen Used on the "Bluenose" and the "New Yorker"

one foot below the floor level, and it has been found quite effective in preventing dust from reaching the passengers.

The construction of this device is simple and it is easily attached to or removed from the car at any time. The screens are not used in rainy weather.

The canvas, which extends 5 ft. 4 in. back from the supports beneath the platform is well shown in the illustration, except that the reader must use his imagination to picture its width, which is 6 ft. 6 in. The supporting frame is of galvanized iron pipe, ¾ in. in diameter, and the struts which are connected to the platform rail are of hard wood, the upper ends being fastened to the rail by leather straps. The only special construction needed is the socket, attached to the car step, to hold the inner end of the frame.

Looking Backward

Fifty Years Ago

In a discussion upon the relative merits of stub and split switches at the first meeting of the International Road-Masters' Association at Niagara Falls, N. Y., the roadmasters who expressed themselves on the subject were well divided in opinion. The stub switch was referred to as unsafe and expensive to maintain, although some objection was voiced to split switches because of the difficulty of keeping them clear of ice and snow.—*Railroad Gazette,* October 24, 1879.

As an example of ruinous rates caused by competition during the past summer, passengers have been carried from Bloomington, Ill., to Niagara Falls, N. Y., and return, 1,316 miles, via the Indiana, Bloomington & Western, the Cleveland, Columbus, Cincinnati & Indianapolis [both now parts of the Cleveland, Cincinnati, Chicago & St. Louis], the Lake Shore & Michigan Southern and the New York Central [of which the former road is a part] for $8, including sleeping car berths, or about 0.6 cents per mile.—*Railway Age,* October 23, 1879.

A St. Paul-Montreal railroad is the latest "great trunk line" projected, and what might appear to be the least practicable. The proposition is to construct a railroad from St. Paul, Minn., across northern Wisconsin and the Upper Peninsula of Michigan, where there is hardly any population and scarcely any source of traffic except lumber, to Sault Ste. Marie [now part of the Minneapolis, St. Paul & Sault Ste. Marie], 425 miles, to be met there by an extension of the Canada Central [now a part of the Canadian Pacific], through the wilderness to Lake Nipissing, about 250 miles, making, in connection with completed roads, a line about 1,000 miles long from Montreal to St. Paul.—*Railroad Gazette,* October 24, 1879.

Twenty-Five Years Ago

L. S. Hungerford, assistant general superintendent of the Pullman Company, has been appointed general superintendent, with headquarters at Chicago. *Railway Age,* October 28, 1904.

A meeting of railway operative officials was held in Montreal on October 6, with a view of formulating a uniform set of rules to be presented to the Canadian Board of Railroad Commissioners, 15 railways being represented by 21 officers. The general superintendent of transportation of the Canadian Pacific suggested that the Canadian Pacific book of rules be adopted as a basis, inasmuch as it was based upon the latest issue of the standard code of the American Railway Association, and in accord with all provisions of the Canadian railway act.—*Railway Age,* October 28, 1904.

Ten Years Ago

H. B. Voorhees, general superintendent of transportation of the Baltimore & Ohio, has been appointed manager of the Staten Island Rapid Transit, the Staten Island and the New York terminals of the Baltimore & Ohio, with office at New York.—*Railway Age,* October 24, 1919.

Director General Hines on October 18 issued a statement in reply to the resolution adopted by the Association of Railroad Executives, objecting to the position he has taken in opposing an increase in rates. Mr. Hines declared that the request means that the Railroad Administration should make increases during federal control for the sole and exclusive benefit of the railroads under private management after the end of federal control, a procedure to which he strongly objects.—*Railway Review,* October 25, 1919.

The railroad labor organizations and the American Federation of Labor have united their forces to oppose the proposed anti-strike legislation now pending in Congress, which is included in the Cummins bill in the Senate and several bills in the House. The executive officers of the four train-service brotherhoods have joined with the executive council of the Federation in a call for a general labor conference to be held at Washington on December 13 by representatives of 112 national and international unions.—*Railway Age,* October 24, 1919.

Communications and Books

Locomotive Performance Records

DALLAS, TEX.

TO THE EDITOR:

In the *Railway Age* issue of September 21, John E. Muhlfeld commented on the performance of Frisco locomotive 4113 which, in special operation between Kansas City and Birmingham, July 19 to August 13, made 7,350 miles in freight service, producing 13,780,749 gross ton-miles, or 1,875 gross ton-miles per locomotive mile. He called attention to the performance of two Kansas City Southern Mallet locomotives operating between Pittsburg, Kan., and DeQueen, Ark., a distance of 305 miles, which, in July, in regular freight operation, performed as follows: Locomotive 760 made 6,104 miles, developing 11,427,370 gross ton-miles, or 1,872 gross ton-miles per locomotive-mile; locomotive 765 made 5,238 miles, resulting in 11,591,026 gross ton-miles or 2,213 gross ton-miles per locomotive-mile.

On the St. Louis district of the Missouri-Kansas-Texas, Mikado-type locomotives in through freight service operate between St. Louis, Mo., and Parsons, Kan., a distance of 377 miles. These locomotives have a tractive force of 64,000 lb; with the booster working, the tractive force is about 75,000 lb. The following is a record made by four of these locomotives on this district during the month of August:

Locomotive number	Total miles	Total gross ton-miles	Gross ton-miles per loco.-mile
905	6,057	18,380,000	3,035
915	6,139	18,383,000	2,995
881	6,313	21,129,000	3,346
883	6,715	21,746,000	3,238

The records of other locomotives in through freight service are not very far behind the four shown here.

The average speed of through freight trains on this district in August was 16.6 m.p.h.; fuel consumption, 88 lb. per 1,000 gross ton-miles.

H. E. McGEE,
Vice-President and General Manager,
Missouri-Kansas-Texas Lines.

Watchfulness to Prevent Inadequate Highway Openings

CHICAGO, ILL.

TO THE EDITOR:

I have read the editorial on "A New Form of Hazard" with considerable interest and as an indication of my appreciation, I enclose a circular letter which I am sending to our assistant chief engineers, district engineers and division engineers, calling their attention to this matter, from which I quote in part as follows:

Your attention is called to the editorial entitled "A New Form of Hazard" in the *Railway Age* of August 17. The hazard referred to is the serious wreck of a train near Stratton, Colo., July 18, in which 10 persons were killed and 39 injured, due entirely to conditions brought about by the construction of an inadequate waterway on the highway adjoining the railroad, which caused a washout at the railway bridge—a permanent structure, and under former conditions, of ample capacity.

We have at times had serious drainage and flood conditions brought about by highway construction, and this is to call your attention to the need of watchfulness on the part of all concerned with respect to highway construction, and in fact all kinds of construction adjoining our tracks, which may result in changing drainage conditions to our damage.

At various times in the past, we have had more or less difficulty from this same source, but we have aimed to be watchful and I believe that our difficulties have never become quite so serious as in the case which prompted your editorial.

We had quite a glaring case in a western state where the state highway commission built a new road for several miles on sloping ground above our track, and utterly ignored the location of the openings in our track, but we made such a complaint about this that it had a very good effect in preventing further occurrences of a similar nature.

CHIEF ENGINEER.

Books and Articles of Special Interest to Railroaders

(Compiled by Elizabeth Cullen, Reference Librarian, Bureau of Railway Economics, Washington, D. C.)

Books and Pamphlets

Doctrina Constitutional, by Juan A. González Calderón. Includes "Tarifas de transportes para reparticiones nacionales" p. 274-284, "Los ferrocarriles ante el poder de policia" p. 285-301 and "Revisión de tarifas ferroviarias" p. 302-319. 406 p. Pub. by J. Lajouane & cia., Buenos Aires, Argentine Republic.

The "Flying Scotsman"—The World's Most Famous Express with the World's Longest Daily Non-Stop Run. "The story of the 'Flying Scotsman' is very nearly the history of the old Great Northern Railway, if not of the East Coast Route as a whole, so that it is necessary to start by giving a few notes as to conditions before June, 1862 when the '10 o'clock' began its long series of journeys between London and Edinburgh." p. 7. This train has made some 21,000 journeys. Illustrated. Third edition, 1929. 128 p. Pub. by London & North Eastern Railway, London, England. 1 shilling. (Obtainable in this country from London & North Eastern Railway Office, New York City.)

High Finance in the Sixties, edited by Frederick C. Hicks. A reprint of the papers on the Erie by Charles Francis Adams, Henry Adams, Albert Stickney, George Ticknor Curtis and Jeremiah S. Black, with a foreword and a chronological history of the Erie in the 1860s. 410 p. Pub. by Yale University Press, New Haven, Conn., $5.00.

The Interstate Commerce Act . . . Revised to July 1, 1929. Published by the Interstate Commerce Commission and including text or related sections of 29 acts relating to interstate commerce. "Transportation Act, 1920, as amended" p. 121-231. Cross references to United States Code and a good index are considerable aids to reference use. 363 p. Pub. by U. S. Govt. Print. Off., Washington, D. C., 60 cents.

A Transportation Glossary for Students, by H. G. Brady. "Terms and phrases in common usage in air, highway, railroad and ocean transportation and in port traffic." 105 p. Pub. by Simmons-Boardman Pub. Co., New York City, $1.75.

Periodical Articles

Dictionaries in English and Foreign Languages—A Bibliographical Review, by James Geddes, Jr. An interesting review of modern English, French, Italian, Spanish, Portugese, German, and Esperanto Dictionaries including several technical dictionaries. Library Journal, October 15, 1929, p. 843-849.

The Electric Lamp—Fifty Years Ago and To-day, by Shaemas O'Sheel. To those who take modern lighting of everything from a room to a railroad yard more or less for granted it may be difficult to realize that in 1880 when Edison first made electric lamps on a commercial scale, his output totaled about 30,000 lamps. "Today the electric lamp factories of America alone produce this number of units every ten minutes of the working day." p. 34. Forbes, October 15, 1929, p. 34.

The Klydonograph. "We have not chained the lightning but we can measure it . . ." The klydonograph is really a very sensitive camera that is now installed on many transmission lines in the United States for the purpose of indicating the magnitude, the polarity, the steepness, and the direction of travel of a lightning bolt. Illustrated. Stone & Webster Journal, October, 1929, p. 538, 539.

Prosperity of Railroads Aided by Good Management, by G. T. Willard. Results of improved methods. Wall Street Review, September 17, 1929, p. 9, 25.

What the Transit Lines Need Most, by Paul Shoup. "I have never heard the term *'renaissance'* applied to the electric railway industry, but it is from exactly such a period of rebirth that the urban and interurban electric lines of the United States are today beginning to emerge." p. 50. Forbes, October 15, 1929, p. 50, 52.

Odds and Ends of Railroading

The Baltimore & Ohio contributes Miss Mary Smith of Terra Alta, W. Va., as another lady crossing watcher.

The Canadian National claims the speed record for transcontinental rail travel, one of its oil electric locomotives having traveled from Montreal, Que., to Vancouver, B. C., 2,944 miles, in 67 hours.

Waste Not, Want Not

F. E. Winburn, special representative of the American Railway Association, sends in the following account of the after effects of freight claim prevention work: Philip Szutkoski, railroad employee of Eland, Wis., acted "according to Hoyle" by eating 63 raw eggs in 20 min. to save them from spoiling when they were found cracked and broken in shipment. Szutkoski explained his act by stating that the railroad book of rules calls upon every employee to exert every influence to protect shipments handled by the carrier.

D. W. Griffith Has a Rival

Chairman E. I. Lewis, of the Interstate Commerce Commission, has blossomed forth as a movie director and producer. It all started when Mr. Lewis attended the Fair of the Iron Horse with a movie camera. To the record of the history of transportation he obtained there, he has painstakingly added other reels, including material from the British Railway Centennial. He has overlooked no opportunities to obtain a moving picture record of everything pertinent to the history of transportation, and now has several reels of extremely interesting movies.

An Unsung Hero

Joe Ford, oldest telegrapher on the Missouri Pacific in point of seniority, has a record of which any man might be proud. For 46 years he has been "pounding brass" on the Eastern division, during which time he has copied more than half a million train orders. He has never made an error in the copying of a train order, nor has he ever failed to deliver one to a train. At a conservative estimate, the safety of twenty million passengers has been in his care, a trust properly placed if Joe's record is scanned. Other men may fly over oceans, build skyscrapers, dig canals, but in its way Joe's performance equals any of these.

A Persistent Cuss

It is not unusual for automobiles to crash into trains, nor is it unusual for the same driver to crash into a train the second time, but it is most unusual for an automobile to hit the same train 36 times. That's what happened when Jack Rohrbough of Monett, Mo., disputed crossing rights with a Frisco train. Rohrbough was driving on a street approaching a railroad crossing, when he discovered a train bearing down on him. He applied the brakes, but his car skidded against the train. Each time it hit a freight car it would bounce back in time to get a bump from the next car. The first freight car the auto hit was the thirty-sixth from the rear of the train and from there on the machine did not miss any of them. By the time the caboose rolled over the crossing the motor car was a wreck and Rohrbough was suffering from injuries to his back. No bones were broken, however.

A Brother Act

There are six Adams brothers in Huntington, W. Va., all employed by the Chesapeake & Ohio on the Huntington division. Frequently, they are assigned to duties that bring them together. In 1917 the entire six were called and made a special run as a full train crew from Huntington, W. Va., to Charleston, W. Va., on a relief train. They were not selected to make the trip on account of being brothers, but the calls resulted in this coincidence that all served together. There are in this group an engineman, John Adams; a conductor, Charley Adams; a fireman, Tim J. Adams; two brakemen, Lacey C. and W. M. Adams, and a machinist helper, Ira L. Adams. It is considered highly improbable that there are in service on any other railroad six brothers, constituting a full train crew and one mechanic.

Peculiarly enough, there is another C. & O. family at Huntington consisting of six brothers, with a father thrown in for good measure. All of the brothers have worked at Huntington shops, five of them serving their apprenticeships there. The father, W. N. Hinerman, is a hostler, one brother is a gang foreman, another is supervisor of machine tool production, while two are machinists, all at Huntington. Still another brother is a general foreman at Covington, Ky.

"Yo! Ho! and a Tank of Gas!"

In spite of the number of motorboats used, one doesn't ordinarily think of gasoline as a sailor, still less are we inclined to associate gasoline with bathing beauties or long-distance swimmers; yet after all, gasoline has 'em all beaten when it comes to navigating the more or less briny deep. The point is, gasoline floats on water, which gives it a running start over its competitors in a swimming contest. Furthermore, if some kind soul will only provide a spark or so, the gasoline will furnish the rest of the entertainment on a scale that will make an Olympic swimming race look like an exhibit of wax figures. Let's look at a case in point.

On the bank of a well-known river, the only river in the country that flows thus-and-so, there are some railroad transfer sheds, with a track between them separated from the water's edge only by a bumping block at the end of it. Now, they put bumping blocks on sidings to keep cars from going off the end of the track. It is, however, considered poor form to run a car into the bumping block, even ever so gently, true artistry requiring making a stop several feet away. This is also a requirement of ordinary horse-sense. What a terrible faux pas it is, then, not only to shove a car against the bumping block, but to do so with such enthusiasm that the bumping block retreats in more or less disorder, permitting the car to continue on to forbidden territory.

In the case we have under discussion, the switching crew rolled merrily in on the spur with the tank car full of gasoline. Perhaps they thought they were on the main line with a clear track, or more probably, perhaps they didn't think at all, or not quickly enough. Maybe the brakes were out of order, or any one of half-a-dozen "maybes". Whatever the idea really was, the tank car could not tell that 'twas not time for a Saturday night bath, and shouldering the bumping block rudely from its path, it volplaned into the river. Lacking practice in diving, it bungled the job sufficiently to knock the bottom outlet boot off; and despite precautions to the contrary, knocking off the boot generally means relieving the outlet valve of its duties. As a result, enough gasoline came gurgling out to run, for a distance of 50 ft., all the Fords that ever were built.

This amount of fluid, with the drops placed both end to end and side by side, was enough to reach, by swimming, all the way from the scene of the accident to the nearest available spark, as generally is the case. It seems that there were some houseboats a short way downstream, and somebody on one of the boats was using a fire for cooking. Ordinarily, you'd think there was nothing safer in the world than to light a fire on a river half a mile wide, and deep enough to float a steamship; but these days you never can tell, can you? Anyway, we are going to draw the curtain over what happened to those houseboats! As is so often the case, the innocent paid, just because somebody forgot, even for a few seconds, that a tank car of gasoline is not so much safer than a carload of T. N. T. after all!—Bureau of Explosives Bulletin.

NEWS *of the* WEEK

On the Central Vermont Near Swanton, Vt.

THE TRANSPORTATION CLUB OF LOUISVILLE will hold its seventeenth annual dinner on October 31 at the Brown hotel.

THE CLEVELAND (OHIO) RAILWAY CLUB will hold its next meeting at Hotel Hollenden, on Monday, November 4.

A MONUMENT bearing an inscription stating that the Chicago, Burlington & Quincy was "born in Aurora village 80 years ago, February 9, 1929," was dedicated at the company's passenger station in that city on October 19.

THE ST. LOUIS RAILWAY CLUB will hold its next meeting at Hotel Statler, St. Louis, on Friday evening, November 8. D. W. Lloyd of the Westinghouse Air Brake Company will present a paper on the great contribution of air brakes to transportation.

SIBERT YARD of the Louisville & Nashville, at Mobile, Ala., recently completed, with an engine terminal and mechanical department facilities was placed in service on October 6. The new yard, which is operated in conjunction with the new Alabama state docks at Mobile, has a capacity of 900 cars.

A GRAND TRUNK CAR FERRY which should have arrived at Grand Haven, Mich., at three o'clock on the morning of October 23 on its trip from Milwaukee had not been accounted for on the morning of October 24. An unusually heavy storm prevailed on Lake Michigan. With the load of twenty-six freight cars the vessel had a crew of fifty-two persons. The boat had started on Tuesday afternoon but had been forced back into port and the trip was again begun at eight o'clock in the evening. The run is usually one of about six hours.

Erie Opens New Freight Station at Bloomfield, N. J.

With a luncheon to several hundred interested shippers and traffic representatives, the Erie opened its new l.c.l. freight station at Bloomfield, N. J., on October 21. The new terminal, located in the center of one of the largest industrial sections of New Jersey, has been designed to take care of the anticipated future industrial development of the district.

It is located at Grove street and Bloomfield avenue, Bloomfield, N. J., and is a two-story brick and concrete structure, 138 ft. by 171 ft., with approximately 11,500 sq. ft. of floor space. The building includes a large room for the handling of general freight, a smaller room for perishable freight, offices for a force of from 25 to 30 employees and the necessary record rooms. It is served by track and loading platform facilities with a total capacity of 63 cars of 45 ft. length, additional storage and team tracks, a 5-ton industrial scale and a 30-ton electric traveling crane, while a large number of covered platforms connected with adjacent streets by wide driveways are also provided for truck loading and unloading.

The Old Guard at Nashville

Seventy-five members of the "Old Guard" of the Nashville, Chattanooga & St. Louis, an organization composed of employees who have been in the service of the company for 40 years or more, met in annual reunion at Nashville, Tenn. on October 17. Charles Barham, vice-president and traffic manager, spoke on the early history of the railroad.

New England Governors Discuss Consolidation

Following a recent meeting in Boston, at which the various proposals for railroad consolidation now before the Interstate Commerce Commission were discussed, the governors of the six New England states announced that they had decided to form a special advisory committee of thirty members to "consider the transportation facilities of New England in their relation to the best interests of New England."

At this meeting, as at others called by the governors and attended by special representatives of the states and of some of the New England railroads, it was generally felt that New England would be better served by a consolidation of all of its railroads into one unified system, than by assignment of those roads to trunk line groupings controlled outside of New England. The formation of the committee mentioned above is commonly regarded in Boston as being the first step in a campaign to bring about such a unification of the New England roads into a single system.

At the same time the Boston Chamber of Commerce, through its transportation committee, has taken active steps toward that end. A letter has been addressed to commercial bodies and shippers throughout the six states, asking their support and setting forth reasons in favor of an all-New England consolidation, while permission has been secured to intervene in the Interstate Commerce Commission hearings on the consolidation plans filed by the Wabash and the Delaware & Hudson, with the purpose of presenting evidence against both of those schemes.

N. Y. Merchant Truckmen to Forbid Loading by Drivers

In an effort to reduce the operating costs of its members by promoting intensive use of trucks, the executive committee of the Merchant Truckmen's Bureau of New York, at a recent meeting, adopted unanimously two resolutions, effective November 1, calling upon the transportation lines serving New York to facilitate the handling of goods by doing transfer and loading work that is now being done by truck drivers and their helpers. It was further decided to notify the various carriers of the action taken by a letter, the text of which follows, in part:

"In the past, truckmen generally have submitted to all rules and regulations of transportation lines in the receiving and delivering of freight; but since the recent wage adjustments they have found it necessary to give closer attention to delays at piers and terminals and to their operating costs.

"Since the installation of tractors and trailers in the loading and unloading of freight at piers, truckmen have been compelled to do a part of the labor of the various lines and this has reached a point where, on several lines, drivers are flatly told no assistance will be given in loading, or securing or hauling away from tail of truck, of trailers. As a result, the Executive Committee of this Bureau has passed the following resolutions:

"Resolved, That on and after November 1 drivers of members of this bureau will no longer secure flat trucks or load said flat trucks unaided; and

"Resolved, That drivers shall do no other

manual labor in delivering freight at the terminals that should be performed by the carriers."

Pennsylvania to Extend Electrification to Washington

Negotiations have just been concluded between the Pennsylvania and the city of Baltimore which have opened the way for complete electrification of the Pennsylvania's main line from New York to Washington, including the mileage within the Baltimore city limits and the Baltimore tunnels. This makes possible the extension of the electrification now in progress from New York to Wilmington, Del., to include the line south from Wilmington to Washington and the freight and passenger terminal areas at the latter point. Completion of the newly-announced project and of the others now under way will give the Pennsylvania a total of 799 miles of line and 2,759 miles of track under electric operation, all capable of handling much more traffic than their present capacity allows.

The new agreements with the city of Baltimore, which have been under negotiation for several years, also cover extensive station platform and track im-

Operating Revenues and Operating Expenses of Class I Steam Railways in the United States

Compiled from the Monthly Reports of Revenues and Expenses for 180 Steam Railways, Including 16 Switching and Terminal Companies

FOR THE MONTH OF AUGUST, 1929 AND 1928

Item	United States		Eastern District		Southern District		Western District	
	1929	1928	1929	1928	1929	1928	1929	1928
Average number of miles operated	241,583.03	241,411.21	60,147.45	60,135.24	45,772.17	45,795.33	135,663.41	135,480.64
Revenues:								
Freight	$446,001,263	$421,770,879	$189,115,870	$178,295,862	$73,462,193	$69,475,259	$183,423,200	$173,999,758
Passenger	a 84,267,453	b 85,187,302	46,483,083	45,976,544	9,849,561	10,605,576	27,934,809	28,605,182
Mail	c 11,178,892	8,851,168	4,952,944	3,489,505	1,801,898	1,503,078	4,424,050	3,858,585
Express	12,195,141	11,433,148	5,832,136	5,247,293	1,476,355	1,333,186	4,886,650	4,852,669
All other transportat'n	18,971,007	18,650,713	11,260,829	10,682,525	1,190,687	1,179,313	6,519,491	6,788,875
Incidental	12,905,217	12,053,965	6,227,302	5,904,496	1,173,239	1,202,273	5,504,676	4,947,196
Joint facility—Cr.	1,361,989	1,090,768	373,473	422,364	277,822	167,637	710,694	500,767
Joint facility—Dr.	317,605	286,444	80,883	76,668	38,660	35,194	198,062	174,582
Railway operating revenues	586,563,357	558,751,499	264,164,754	249,941,921	89,193,095	85,431,128	233,205,508	223,378,450
Expenses:								
Maintenance of way and structures	82,796,501	77,036,359	35,781,924	33,470,688	12,933,328	12,636,930	34,081,249	30,928,741
Maintenance of equipment	103,042,602	99,570,329	48,617,759	46,171,567	18,535,197	17,162,236	35,889,646	36,236,526
Traffic	10,904,093	10,322,144	4,325,955	3,900,256	1,883,793	1,995,040	4,694,345	4,426,848
Transportation	178,885,791	177,971,876	84,465,136	82,451,915	26,866,718	27,428,907	67,553,937	68,091,054
Miscellaneous operat'ns	5,447,812	5,086,852	2,397,776	2,274,290	463,357	475,717	2,586,679	2,336,845
General	16,026,436	15,984,871	6,959,920	7,214,453	2,739,665	2,680,035	6,326,850	6,090,383
Transportation for investment—Cr.	1,417,133	1,444,687	377,418	311,992	136,328	114,349	903,387	1,018,346
Railway operating expenses	395,686,102	384,527,744	182,171,052	175,171,177	63,285,731	62,264,516	150,229,319	147,092,051
Net revenue from railway operations	190,877,255	174,223,755	81,993,702	74,770,744	25,907,364	23,166,612	82,976,189	76,286,399
Railway tax accruals	38,566,025	35,402,895	16,755,970	15,610,706	6,364,965	5,676,565	15,445,110	14,115,624
Uncollectible ry. revs.	79,620	93,333	27,003	45,562	28,013	19,504	24,604	28,267
Railway operating income	152,231,610	138,727,527	65,210,729	59,114,476	19,514,406	17,470,543	67,506,475	62,142,508
Equipment rents—Dr. balance	8,474,953	8,216,825	3,847,343	4,066,999	d 1,054,627	d 686,686	5,682,237	4,836,512
Joint facility rent—Dr. balance	2,320,560	2,075,076	1,295,071	1,129,743	217,256	171,748	808,233	773,585
Net railway operating income	141,436,097	128,435,626	60,068,315	53,917,734	20,351,777	17,985,481	61,016,005	56,532,411
Ratio of expenses to revenues (per cent)	67.46	68.82	68.96	70.08	70.95	72.88	64.42	65.85

FOR EIGHT MONTHS ENDED WITH AUGUST, 1929 AND 1928

Average number of miles operated	241,587.70	240,968.85	60,164.62	60,119.30	45,765.63	45,702.04	135,657.45	135,147.51
Revenues:								
Freight	$3,182,494,579	$2,997,106,511	$1,398,264,090	$1,301,520,801	$565,587,496	$543,323,453	$1,218,642,993	$1,152,262,257
Passenger	e 594,811,779	f 610,300,741	315,168,793	319,018,025	82,647,677	89,469,712	196,995,309	201,813,004
Mail	g 99,492,483	64,304,270	38,650,008	24,525,344	15,594,927	11,190,546	45,247,548	28,588,380
Express	95,223,206	89,010,525	43,561,452	40,788,606	14,896,604	13,369,833	36,765,150	34,852,086
All other transportat'n	141,230,495	136,778,923	81,826,677	77,368,041	9,743,393	9,507,741	49,660,425	49,903,141
Incidental	89,083,790	81,442,758	45,210,285	40,798,534	10,941,409	11,124,883	32,932,096	29,519,341
Joint facility—Cr.	8,658,680	8,911,093	2,785,208	3,484,432	1,389,778	1,270,313	4,483,694	4,156,348
Joint facility—Dr.	2,601,604	2,923,079	651,437	1,005,417	279,138	278,483	1,671,029	1,639,179
Railway operating revenues	4,208,393,408	3,984,931,742	1,924,815,076	1,806,498,366	700,522,146	678,977,998	1,583,056,186	1,499,455,378
Expenses:								
Maintenance of way and structures	577,990,195	564,045,690	240,237,082	232,579,033	100,882,908	98,495,366	236,870,206	232,971,291
Maintenance of equipment	807,103,904	782,431,928	384,217,124	364,627,917	141,074,546	139,826,460	281,812,234	277,977,551
Traffic	86,785,828	83,972,099	32,938,523	31,242,671	15,790,052	16,160,598	38,057,253	36,568,830
Transportation	1,398,804,111	1,382,964,597	662,590,709	649,266,700	220,393,459	224,288,538	515,819,943	509,409,359
Miscellaneous operat'ns	39,544,896	37,517,704	18,003,220	17,429,100	4,485,327	4,750,582	17,056,349	15,338,022
General	129,392,024	129,314,472	56,394,496	57,956,279	21,830,711	21,620,216	51,166,817	49,737,977
Transportation for investment—Cr.	8,594,444	10,118,910	2,007,969	1,686,579	668,470	877,712	5,918,005	7,554,619
Railway operating expenses	3,031,026,515	2,970,127,580	1,392,373,185	1,351,415,121	503,788,533	504,264,048	1,134,864,797	1,114,448,411
Net revenue from railway operations	1,177,366,893	1,014,804,162	532,441,891	455,083,245	196,733,613	174,713,950	448,191,389	385,006,967
Railway tax accruals	270,724,602	250,908,395	114,504,878	105,844,545	48,907,292	46,039,281	107,312,432	99,024,569
Uncollectible ry. revs.	757,755	859,679	304,412	431,761	180,306	147,213	273,037	280,705
Railway operating income	905,884,536	763,036,088	417,632,601	348,806,939	147,646,015	128,527,456	340,605,920	285,701,693
Equipment rents—Dr. balance	61,511,430	60,661,659	33,196,621	32,780,303	d 1,238,812	d 312,058	29,553,621	28,193,414
Joint facility rent—Dr. balance	16,638,130	16,292,798	8,368,092	8,337,741	1,617,605	1,430,452	6,652,433	6,524,605
Net railway operating income	827,734,976	686,081,631	376,067,888	307,688,895	147,267,222	127,409,062	304,399,866	250,983,674
Ratio of expenses to revenues (per cent)	72.02	74.53	72.34	74.81	71.92	74.27	71.69	74.32

a Includes $3,805,209 sleeping and parlor car surcharge. b Includes $3,798,997 sleeping and parlor car surcharge. c Includes approximately $1,989,127 back railway mail pay. d Deficit or other reverse items. e Includes $27,373,403 sleeping and parlor car surcharge. f Includes $26,662,710 sleeping and parlor car surcharge. g Includes approximately $25,739,500 back railway mail pay.

Compiled by the Bureau of Statistics, Interstate Commerce Commission. Subject to revision.

provements in and through Baltimore and the construction of two new double-track tunnels within the city limits.

Ordinances covering the agreements reached have been accepted by the railroad officers and by affiliated companies concerned in the project.

One of the new double-track tunnels to be constructed in Baltimore will parallel the existing Union Railroad tunnel east of the Pennsylvania station. It will be located on private property adjacent to the south side of Hoffman street, and will be of the same length as the old tunnel, approximately two-thirds of a mile. The other new tunnel, to be built by the bore method, will be on private property adjacent to the north side of Prestman street and roughly parallel to the present Philadelphia, Baltimore & Washington tunnel southwest of the Pennsylvania passenger station. Its top will average 80 feet below the street level, while its length will be approximately one and five-eighths miles, as compared with one and one-half miles for the existing tunnel. The completion of these two new tunnels will allow the Pennsylvania to operate a four track main line all the way through Baltimore from the eastern to the southwestern city limits, a distance of six miles. Both tunnels will have ample clearance for the largest equipment and special shipments.

The Baltimore improvement program announced in connection with the electrification also contemplates the rebuilding of Calvert station, the construction of two large freight warehouses adjacent to that station and the elimination of all grade crossings within the city limits.

Although actual work will be started immediately, between five and six years are allowed for the completion of the tunnels, station, warehouses, grade separation work and electrification. It is expected that the New York-Wilmington electrification will have been completed before the expiration of that period.

Missouri Pacific Asks Relief from Arkansas Full Crew Law

A petition for an interlocutory order, restraining enforcement of the Arkansas full crew law was filed in a federal court at Fort Smith, Ark., on October 19 by the Missouri Pacific against H. L. Norwood, attorney general of Arkansas, and two prosecuting attorneys of the state. The railroad alleges that the law imposes a burden upon the railway and is in conflict with the interstate commerce and the railway labor acts. The same law was upheld by the United States Supreme Court some 20 years ago when attacked by the Chicago, Rock Island & Pacific on the ground that it was discriminatory in that it applies only to roads which are more than 50 miles long.

Application for Oregon-Nevada Line Abandoned

The hearing before an Interstate Commerce Commission examiner at San Francisco, Cal., on the application of the Idaho Pacific Railroad for authority to construct a railroad from Nyssa, Ore., to Winnemucca, Nev., about 238 miles, was suddenly brought to a close on October 15 when an attorney for the new company presented a motion to dismiss the application. Unexpected opposition to the construction of the line from the Southern Pacific, the Union Pacific and the Oregon Short Line developed at the hearing, which began on October 14. The attorney for the Idaho Pacific indicated that a new application might be filed with the Commission in the near future.

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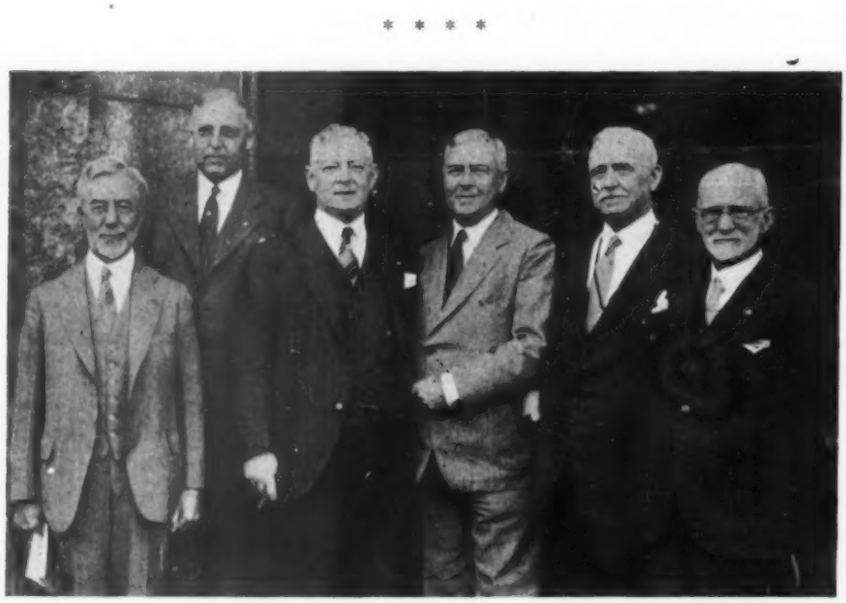

A Group of Rock Island Surgeons

A total of 300 surgeons and members of their families attended the twenty-fifth annual meeting of the Surgical Association of the Chicago, Rock Island & Pacific at Denver, Colo., on September 17 and 18. The attendance included: (left to right) Dr. S. C. Plummer, chief surgeon, Chicago; Dr. G. E. Harkness, Davenport, Ia.; Dr. P. A. Bendixen, Davenport; J. S. Palmer, general claim agent, Chicago; Dr. A. R. Mitchell, Lincoln, Neb.; and Dr. C. R. Hume, Anadarko, Okla.

Traffic

The general committee of the Freight Claim Division of the American Railway Association has selected the four-day period of June 10 to 13 for the 1930 annual session which will be held at the Olympic hotel at Seattle, Wash.

The Northern Pacific will display apples grown along its lines in 12 large cities, including New York and Chicago, during national apple week, October 31 to November 6. In further co-operation with the sponsors of national apple week, the railway company has arranged special dining car menus, featuring apple dishes.

The Northwest Shippers' Advisory Board will hold its next meeting in the New Duluth Hotel, Duluth, Minn., on October 29. Ralph Budd, president of the Great Northern, will address the meeting on the subject, Shipper and Carrier Co-operation in the Handling of the Grain Crop.

Examiner George M. Curtis, of the Interstate Commerce Commission, has submitted a proposed report recommending that the commission find that the rate of $1.02 per net ton on ex-river bituminous coal from Conway and Colona, Pa., to Youngstown, Ohio, proposed in tariffs filed by the Pennsylvania and Pittsburgh & Lake Erie is unjustified and that the rate should not exceed 80 cents.

R. B. A. Special Train

For New Yorkers enroute to the Railway Business Association annual meeting at Chicago the Pennsylvania announces a special section of the Pennsylvania Limited to leave New York at 2 p. m., November 20. G. LeBoutillier, vice-president will be in charge. A special train or special cars as the occasion demands will be operated for the return trip. M. N. Luth, division passenger agent at New York, is taking reservations.

Canadian Grain Embargo

At the same time last week that the embargo against the railways moving grain to the head of the Great Lakes from Western Canada was cancelled another embargo was imposed against loading grain for Government bins on both the Canadian Pacific and the Canadian National in the prairie provinces.

Both the cancellation of the limiting of grain movements to the head of the Lakes and the car rationing itself were equally in the interest and to the advantage of the railways, the shippers and the public generally, it was asserted by H. Jasper Humphrey, assistant to the vice-president of the Canadian Pacific in Toronto last week. Should indications point again to any rail congestion at the head of the Lakes, the embargo will be ordered resumed, he said.

Mr. Humphrey said the railways were

determined to prevent any further congestion of storage facilities or shipments at Fort William. "Quite obviously," he added, "we are interested in keeping grain moving eastward to obtain as good gross earnings figures as possible for this year. But if we encouraged the movement of grain to the Head of the Lakes when the storage facilities there are full, and there is no place to put the wheat when shipped there, we not only decrease our gross but we also add to our operating expenses." He said the railways could not demand payment until wheat had been unloaded from the cars, which would remain idle at Fort William piling up operating expense. That was the situation several weeks ago when "car rationing" was started.

Western Class Rates Argued

The Interstate Commerce Commission and a committee of state commissioners devoted five days this week to hearing oral argument on the proposed report in the Western Trunk Line class rate revision case, Part 2 of the rate structure investigation, by Examiners Koebel and Paulson. The examiners recommended mileage scales of rates for three different zones which they estimated would allow the roads some increase in revenues, Counsel for the roads contended that the estimated increase $24,000,000 a year would be inadequate and that the record showed them to be entitled to an increase of $60,000,000 a year to allow them a fair return.

Hoch-Smith Case Argued in Supreme Court

Arguments were heard by the Supreme Court of the United States on October 21 and 22 as to the validity of an order issued by the Interstate Commerce Commission in 1927, in the California fruit rate case, in which it reduced the rate on deciduous fruits other than apples from California to eastern points from $1.73 to $1.60 per 100 pounds, under the Hoch-Smith resolution, after having dismissed a complaint against the reasonableness of the same rates in 1925. Arguments were presented to the court last year but it later ordered a reargument.

Herman Phleger, representing the railroads, contended that the commission construed the resolution to require it to reduce an existing rate on agricultural products, notwithstanding that the existing rate was reasonable and otherwise lawful, by holding that there exists a zone of reasonableness for every rate and that it could prescribe the "lowest lawful rate" within the zone. "This is an admission," he said "that the rate filed by the carrier is within the zone of reasonableness and the action of the commission in placing the rate at the lowest lawful rate within this zone is to take away from the carrier the right to name his own rate providing it is reasonable and just." He also contended that the rate fixed is confiscatory.

The government was represented by Charles E. Hughes, Jr., solicitor general, who contended that the rate prescribed was not based solely on the depression existing in the industry but also on facts taken into consideration in a proceeding prior to the enactment of the Hoch-Smith resolution. The resolution, he said, sets up no new standard of reasonableness, but provides for the maintenance of the lowest rates on products of agriculture within flexible limits. He asked the court to observe that the rate reduced was 50 per cent above pre-war rates.

Appeal to Canadian Cabinet on B. C. Rates

An appeal to the Dominion Cabinet for an extension of the reductions in freight rates on grain and grain products westbound was brought by the United Farmers of British Columbia in Privy Council Chamber in Ottawa last week. Argument occupied three days. There was practically a full attendance of Cabinet, which was asked to instruct the Board of Railway Commissioners to amend its General Order 448 to abolish the mountain differential, to put British Columbia on the same rate basis on westbound shipments as eastbound grain, to abolish "theoretical mileage" where distances vary between the two railways and to reduce rates on fruit from British Columbia to Prairie points to the same comparative basis as rates between points in eastern Canada of equal mileage.

Another petition, which varies only slightly from that of the United Farmers, from the governments of British Columbia, Alberta and Saskatchewan, was on the table but on a protest from the government of Manitoba, the city of Winnipeg, the Winnipeg Board of Trade and the government of Ontario, on the ground that briefs had not been received in time to permit counsel to prepare their case, it was agreed that the hearing should be postponed until about December 15. Counsel for the railways asked that the petitions both be dismissed outright, J. B. Coyne, K. C., for the Winnipeg Board of Trade had already objected to the appeals on the ground that they were brought two years after the railway commission's order was made and business commitments had been made on the basis of the rate structure contained therein.

After consultation with his Cabinet, Premier Mackenzie King announced that hearing of the appeal of the United Farmers would be proceeded with, because it had been received months ago, proper notice had been given everybody concerned, and the United Farmers had consented to several postponements already to suit other people's convenience.

G. G. McGeer, K. C., for the United Farmers, presented his argument, dealing with the legality of the appeal and the government's right to reopen the equalization case and instruct the Railway Commission as to the broad lines of rate policy. He submitted that poultry and dairy farmers in British Columbia were paying an unreasonable high rate for feed because of the cost of transportation from the prairies.

There was a good deal of discussion between counsel as to whether the appeals should not have been taken to the Board of Railway Commissioners in the form of new applications and Premier Mackenzie King expressed the hope that interested parties would keep in mind the difference in the functions of the Railway Commission and those of the cabinet. He also stated tthat he had received suggestions that the time in which an appeal can be brought against a Railway Commission order should be fixed by statute at three months.

W. N. Tilley, for the Canadian Pacific, submitted that the questions raised in the appeals should have been brought to the Board of Railway Commissioners and not to the Cabinet. E. P. Flintoft, for the Canadian Pacific, and Major Alistair Fraser, for the Canadian National, submitted technical evidence to show that the mountain differential and the spread between the export and domestic rates were justified. A. B. Hudson, representing the Province of Manitoba, J. B. Coyne, for the Winnipeg Board of Trades, and Jules Prudhomme, for the city of Winnipeg, all opposed the appeal on the ground that Manitoba would be injured by an upset of the balance of business and traffic which would be certain to result from a drastic change in the present rate basis.

F. L. C. Starr, for the government of Ontario, submitted that Eastern Canada bore too big a share of the taxation in Canada already, and that Western Canada was not entitled to further reductions in freight rates until the Canadian National Railways were on a better financial footing.

Aime Geoffrion, for the eastern millers, opposed the appeal. D. M. Hossie, representing a British Columbia milling concern, supported it.

The appeal was brought under the provision in the Railway Act whereby the Dominion Cabinet sitting as the Privy Council of Canada, may hear an appeal from a ruling of the Board of Railway Commissioners for Canada on points of equity. Appeals on points of law can be taken to the Supreme Court of Canada.

Judgment was reserved by the Cabinet.

* * *

On the Chicago & North Western at Evanston, Ill.

Foreign

Malay States Railways

A decrease of 3.07 per cent in revenue accompanied by an increase of 1.58 per cent in operating expenses reduced the net earnings of the Federated Malay States Railways for the year 1928 to £302,366 ($1,469,500), a drop of £118,335 ($575,108) as compared with the net surplus of £420,701 ($2,044,606) reported for 1927. Although freight revenue increased 1.71 per cent because of heavy rubber shipments in the last two months of the year, passenger receipts dropped 9.49 per cent and passenger journeys 4.91 per cent as a result of intensive highway competition. The operating ratio for the year stood at 88.59, which compares unfavorably with ratios of 85.08 and 69.27 in 1927 and 1926 respectively. The Federated Malay system embraces 1,036 route miles, mostly of single track.

Argentine Railway Dividends

The continuation of good business conditions resulting from marked agricultural prosperity in the Argentine Republic is reflected in the earnings of the various British-owned Argentine railways, as disclosed by their dividends for the fiscal year ending June 30, 1929. The Argentine North Eastern was the only road which failed to pay any common dividends, although the Cordoba Central paid only two per cent. The Buenos Aires & Pacific, the Buenos Aires Western, the Central Argentine and the Entre Rios each paid at the rate of seven per cent on their common stock, while the Buenos Aires Great Southern distributed eight per cent to its shareholders. In every case, dividends were the same as for 1927-1928.

Betterments from Passenger Tax Savings Announced in Britain

Railways of Great Britain have recently submitted to the Ministry of Transport full particulars of the improvement programs which they are to carry out with the capitalized savings resulting from the remission of the excise tax on passenger fares recommended last spring by former Chancellor of the Exchequer Winston Churchill and adopted by the late Conservative government.

The abolition of these taxes, which since 1921 had stood at two per cent on first and second class fares in certain urban districts and five per cent elsewhere, relieves the railways of a payment to the government in the nature of a special tax of long standing and long considered unfair. For 1929 this payment would have amounted to more than £350,000, a sum equivalent to the interest on approximately £6,000,000, or nearly $30,000,000. It is this latter amount which the government directed the railways to spend on capital additions and betterments, as a condition of the remission of the tax.

As its part of the program, the Great Western proposes to construct a large concentration yard at Acton, to facilitate the handling of freight interchanged with other companies in the London zone and the movement of its own London traffic; to provide increased freight accommodations and a new four-floor warehouse at South Lambeth; to furnish new equipment for its South Wales Docks; to complete the substitution of electric for gas light in all corridor coaches and in all non-corridor coaches containing first-class compartments built since 1900; and to replace 100 locomotives of obsolete type with an equal number of modern locomotives. The total cost of this program is estimated at £850,000, of which £700,000 represents the remitted passenger tax capitalized at six per cent. The remaining £150,000 is a voluntary addition by the railroad.

Approval has already been given to the program of the London, Midland & Scottish, which plans to spend £2,500,000, or $7,500,000, for the following improvements: Fifty-five new locomotives, 30 of which are to be of the Garratt type and 25 of other types; conversion of additional gas-lit coaches to electric lighting; improvements in freight terminals at Camden Town, Birmingham and Stoke-on-Trent, and extensions to coal-shipping plants at Garston, Grangemouth, Ayr, Troon and Swansea; additional main line facilities to eliminate delay to passenger traffic caused by freight movements; additional freight houses and sidings at Goole Docks; and improvements to various passenger stations.

The plan of the London & North Eastern involves an expenditure of £2,000,000. Most of this will be spent in the Romford district, on four-tracking two miles of double-track line between Romford Factory and Romford Junction, the reconstruction of Romford station, and improvements in the freight yards and coach and locomotive terminals at Romford Factory. The construction of additional sidings for coal traffic at Hartlepool, of additional cranes at Parkeston Quay, and extensions to the Doncaster yards are also included.

The Southern plans the construction of 200 additional corridor coaches, half of which will be in service by next summer, at a cost of £400,000.

Italian Electrification

The work of electrifying the Domodossola-Iselle trunk line of the Italian State Railways is progressing satisfactorily, according to Department of Commerce reports. This work is in connection with the electrification of the Simplon tunnel, undertaken jointly by the Italians and Swiss, who are also reported to be making satisfactory progress on their side of the border. To allow the installation of the overhead wires the present line had to be lowered as much as forty centimeters in some places, while telegraph and telephone wires were encased in cables and run underground to prevent danger of induction. Upon the completion of the electrification, about next May, service through the tunnel can be speeded up and the stop to change locomotives at Iselle eliminated.

Equipment and Supplies

Locomotives

THE CANTON & CARTHAGE has ordered one 2-8-2 type locomotive from the American Locomotive Company.

THE NEW ORLEANS, NATALBANY & NATCHEZ has ordered one 2-8-2 type locomotive from the American Locomotive Company.

THE PENNSYLVANIA has ordered 100 4-8-2 (Class N1) type locomotives. Fifty will be built by the Baldwin Locomotive Works; 25 by the Lima Locomotive Works and 25 will be built in the railroad company shops at Altoona. One hundred locomotive tenders will also be built at Altoona. In the *Railway Age* of October 5, authorization by the road for the purchase of the 100 locomotives was reported.

Passenger Cars

THE CHESAPEAKE BEACH has ordered one 73-ft. combination passenger and baggage gas-electric rail motor car from the J. G. Brill Company.

THE URUGUAY STATE RAILWAYS have ordered two combination passenger and baggage gasoline rail motor cars from the J. G. Brill Company.

THE ATCHISON, TOPEKA & SANTA FE'S two gas-electric rail motor cars ordered from the Pullman Car & Manufacturing Corporation and reported in the *Railway Age* of October 19 are to be equipped with 400-hp. power plants furnished by the Electro-Motive Company.

Freight Cars

THE REPUBLIC IRON & STEEL COMPANY is inquiring for eight steel butt cars.

THE CHEVROLET MOTOR COMPANY is inquiring for 20 gondola cars.

THE ATLANTIC REFINING COMPANY is inquiring for six tank cars of 40 tons' capacity.

THE NORFOLK & WESTERN will rebuild 470 all-steel gondola cars of 90-tons' capacity in its Roanoke shops.

THE NEW YORK, CHICAGO & ST. LOUIS is inquiring for ten steel underframes for caboose cars.

BUTLER BROTHERS has ordered 15 lift door air dump cars of 20 yd. capacity, from the Koppel Industrial Car & Equipment Company.

THE PACIFIC FRUIT EXPRESS has ordered 400 refrigerator cars from the Pacific Car & Foundry Company. Inquiry for this equipment was reported in the *Railway Age* of August 10.

THE HUDSON BAY MINING & SMELTING COMPANY, LTD., has ordered 22 air-dump cars of 20 cu. yd. capacity from the Western Wheeled Scraper Company.

THE CHICAGO, BURLINGTON & QUINCY is inquiring for 50 flat cars, 45 ft. long; 50 flat cars, 50 ft. long and 500 automobile cars. As reported in the *Railway Age* of October 5, this company has authorized the purchase of 2700 cars.

Machinery and Tools

THE NORFOLK & WESTERN is inquiring for machine tools and other equipment as follows:

No.	Type
3	500-cu. ft. cross-compound air compressors, motor driven
5	Automatic feedwater regulators
1	10-ton traveling crane (without trolley)
1	20-ton crane trolley
1	Whiting stationary drop table, 50 tons capacity
2	16-in. upright drill presses
1	6-ft. radial drill, motor driven
5	18-in. by 3-in. double floor grinders, motor driven
1	Heald Sizematic internal grinding machine
1	7-in. by 1-in. combination floor grinder and buffer, motor driven
1	Bevel gear cutter, motor driven
8	4,000-lb., 22-ft. lift electric hoists with plain trolleys
2	Smith shop hammers
1	8,000-lb. double frame steam hammer
1	Jarring machine, 30-in. by 36-in. table
2	Combination journal truing and axle turning lathes, center drive, motor driven
1	24-in. heavy duty engine lathe, 8-ft. centers, motor driven
1	48-in. by 10-ft. gap lathe, motor driven
1	90-in. driving wheel lathe, motor driven
1	Heavy-duty turret lathe for 6-in. stock, motor driven
28	Locomotive blows for 24-in. diameter stacks
1	36-in. by 36-in. by 12-ft. planer type milling machine, motor driven
1	36-in. by 36-in. by 12-ft. planer, motor driven
1	Crossrail and two heads fitted with rapid power traverse and motor for 54-in. by 54-in. by 41-ft. 8-in. planer
1	Portable gasoline-driven centrifugal pump, capacity 600 gal. per min.
1	Four-cylinder accumulator pump, motor driven, to deliver 25 gal. per min. against a head of 1,500 lb. per sq. in.
1	Pipe cutting machine, motor driven
2	50-ton power forcing presses, motor driven
1	Self-contained hydraulic press, 750 tons, motor and pump attached
1	36-in. heavy-duty crank shaper arranged for motor drive
1	32-in. heavy duty crank shaper, motor driven
1	Pneumatic flanging press
1	Dumping platform truck, 2 tons capacity, electric drive
1	2½-ton automobile truck
1	1-in. semi-automatic bolt heading machine, motor driven
1	175-kw. frequency changer set
1	Single compartment, car type core oven
20	Four-point No. 18 Ralco receptacles
1	Outdoor type transformer, 250 KVA.
1	Group winding head
2	Hand planers and jointers, motor driven
1	1½-in. vertical hollow chisel mortiser, motor driven
1	24-in. by 6-in. single surface planer, motor driven
1	15-in. portable disc sander, motor driven
2	DeWalt Wonder woodworking machines, equipped with 5-hp. motors
1	Single end tenoner, motor driven
1	Portable variety woodworker with iron frame arranged for motor drive
8	Stationary tilt-type brass melting furnaces, capacity 300 lb. per heat

Iron and Steel

THE ERIE has placed orders for 46,460 tons of rail to be delivered in 1930 as follows: Carnegie Steel Company, 24,387 tons; Illinois Steel Company, 11,112 tons; Bethlehem Steel Company, 7,474 tons; Inland Steel Company, 3,487 tons.

Signaling

THE BALTIMORE & OHIO has ordered from the Union Switch & Signal Company, materials for an interlocking plant at Mountain Lake Park, Md.; 16 mechanical levers and 16 electric.

THE CHESAPEAKE & OHIO has ordered from the Union Switch & Signal Company, material for electro-pneumatic interlocking, 47 levers at KV Cabin, Kenova, W. Va.

THE ATCHISON, TOPEKA & SANTA FE has ordered from the Union Switch & Signal Company 41 searchlight and semaphore dwarf signals, 155 relays and three small interlocking machines preparatory to providing signals for the movement of trains against the current of traffic on the line between Corwith (Chicago) and Joliet, Ill, about 35 miles.

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Atlantic Coast Line Photo

Davenport, Fla., Station on the Atlantic Coast Line

Supply Trade

The **Wagner Elecric Corporation** has moved its Milwaukee, Wis., sales office and service station to 525 Broadway and its St. Louis, Mo., sales office to 909 Plaza Olive building.

The Hill-Curtis Company, Kalamazoo, Mich. has changed its name to **Hammond Machinery Builders, Inc.** No change in the organization or its policies is contemplated.

James P. Allen has resigned as president and general manager of the **Union Steel Casting Company,** Pittsburgh, Pa., also as a director of that company. Mr. Allen will continue on the board of directors of the **Blaw Knox Company** of which the Union Steel Casting Company is a subsidiary.

Frank H. Clark, vice-president and a director of the **Pilliod Company,** New York, has been placed in charge of western sales, with headquarters at Chicago, following the death of J. H. Cooper, western manager. Mr. Clark has been associated with the railway supply business for 35 years, having entered business in 1894 with the Standard Coupler Company. In 1912 he organized the Chambers Valve Company, which was acquired by the Bradford Corporation in 1923, and in 1916, the Edwin Stoker Company. Mr. Clark is also a director of the Bradford Corporation and has been associated with the Pilliod Company during the past ten years.

The International Derrick & Equipment Company, Columbus, Ohio, has bought a plot of ground in Houston, Texas, as a site for a large manufacturing plant. Construction of the first unit will be started shortly. In September this company bought the Boykin Machinery & Supply Company, Beaumont, Texas. This latter has been reorganized as a subsidiary of the International Derrick & Equipment Company and will be known as the International Derrick & Equipment Company of Texas; both the Houston and Beaumont plants will be under the subsidiary company's management.

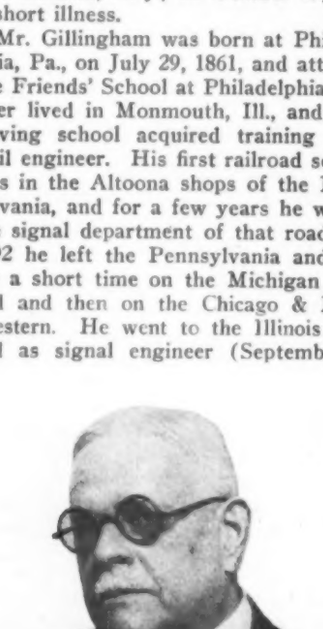
The industrial finishes division of **E. I. du Pont de Nemours & Co.** has organized a transportation sales department to include railway, aviation and marine sales activities. **Alfred E. Pratt,** manager of railway sales, has been appointed manager of transportation sales, with headquarters at Parlin, N. J. **Frank H. Crawford,** western manager, railway sales, has been promoted to eastern manager of transportation sales, with headquarters at Parlin. **L. M. Ritchie,** district manager of railway sales at Cleveland, Ohio, has been promoted to

western manager, transportation sales, with headquarters at Chicago. **Frank P. Quinn,** manager of marine sales, has been appointed district manager of transportation sales, with headquarters at Parlin.

Obituary

William Jenks Gillingham, first president of the Railway Signaling Club, for many years signal engineer of the Illinois Central and, since 1901, engaged in signal manufacturing, died at his home in Plainfield, N. J., on October 17, after a short illness.

Mr. Gillingham was born at Philadelphia, Pa., on July 29, 1861, and attended the Friends' School at Philadelphia. He later lived in Monmouth, Ill., and after leaving school acquired training as a civil engineer. His first railroad service was in the Altoona shops of the Pennsylvania, and for a few years he was in the signal department of that road. In 1892 he left the Pennsylvania and was for a short time on the Michigan Central and then on the Chicago & North Western. He went to the Illinois Central as signal engineer (September 5, 1892) and this position he occupied until 1901. Resigning from the railroad service he entered the employ of the Hall Switch & Signal Company as western sales manager. About the year 1915, he was transferred from Chicago to the eastern headquarters and became general sales manager, subsequently being promoted to vice-president. Since 1925, when the Hall Company was absorbed by the Union Switch & Signal Company, Mr. Gillingham has been connected with the latter company as special representative.



William Jenks Gillingham

In the Railway Signaling Club and the Railway Signal Association (now the Signal Section of the American Railway Association) Mr. Gillingham has been a leading member and in his early years, when the list of members was printed chronologically, his name appeared as Number One. Since leaving the railroad service he has been prominent also in the Signal Appliance Association.

Construction

CANADIAN NATIONAL.—The contract for the construction of a 67-mile branch line from Sunny Brae to Guysborough, N. S., noted in the *Railway Age* of August 17, has been awarded to the Dominion Construction Company, Toronto, Ont. The contract covers the preparation of the right of way, grading, construction of bridges and track-laying. The building of stations, erection of telegraph lines and other special work will be carried out under separate contracts, not yet awarded.

CANADIAN NATIONAL.—This company has recently awarded contracts as follows: to C. W. Bowlin, Woodstock, N. B., for the construction of a station at St. Leonard, N. B.; to the Richardson Construction Company, Toronto, Ont., for the replacement with reinforced concrete abutments and center pier of the present brick abutments of the subway under crossing of Weston road, Weston, Ont., and to W. A. Mackey, Toronto, for grading and other work on a new spur line 2.5 miles in length from M. P. 2 on the Waite-Montgomery branch to the Amulet mine, near Rouyn, Que. Work on the latter project will be completed about December 31. The Canadian National has also acquired a site for the construction of a hotel at Kent and Pownall streets, Charlottetown, P. E. I.

CANADIAN PACIFIC.—Bids have been received for the construction of a second main line track from Sudbury, on the Cartier subdivision, to Azilda, Ontario, a distance of 7.3 miles. It is expected to have the work completed within a year. This will give continuous double track from Romford, 6.6 miles east of Sudbury, to Geneva, 37.4 miles west of Sudbury, a total distance of 44 miles.

CENTRAL OF NEW JERSEY.—Bids have been received for the construction of a steel and concrete bridge at Matawan, N. J.

CHESAPEAKE & OHIO.—A contract has been awarded to Sanders, Castle & Sanders, Ashland, Ky., for light repair work on yard buildings at Hinton, W. Va., at a total cost of $76,783.

CHICAGO, ST. PAUL, MINNEAPOLIS & OMAHA.—A contract for the construction of an enginehouse at Mankato, Minn., has been let to the J. B. Nelson Construction Company, Mankato. With repair facilities, this project will involve an expenditure of about $55,000.

GRAND TRUNK WESTERN.—A contract for the construction of grade-separation structures at 18 streets in the vicinity of Royal Oak, Mich., has been let to A. Guthrie & Co., St. Paul, Minn.

HUDSON BAY.—The minister of railways and canals of Canada has announced plans for the construction of a 2,000,000-bu. grain elevator at Fort Churchill, Ont., work on which will be undertaken in the summer of 1930 for completion in 1931.

LEHIGH VALLEY.—The Public Service Commission of New York has advised this company that it does not consider as excessive bids received in connection with various grade crossing elimination projects, as follows: From the Bethlehem Steel Company for the delivery and erection of structural steel required for the removal of the Getzville highway crossing, Amherst, N. Y., at a cost of $13,440, and for the Sheridan drive crossing, Amherst, N. Y., at a cost of $26,600, and from I. M. Ludington's Sons, Inc., of Rochester, N. Y., for the construction work necessary in the Getzville highway project, at a cost of $75,229 and for the construction work on the Sheridan drive crossing elimination at a cost of $83,314. The Commission has directed that contracts be awarded accordingly.

LONG ISLAND.—Reconstruction of the bridge carrying this company's tracks over North Sea road, Southampton, N. Y., has been ordered by the Public Service Commission of New York. The total cost of rebuilding the structure, which was erected in 1900, and of enlarging the clearance of the underpass from thirteen to fourteen feet is estimated at $53,600.

MISSOURI & NORTH ARKANSAS.—The receiver for this company has acquired seven acres of land adjoining the company's property at Kensett, Ark., for the purpose of constructing a roundhouse, a machine shop and a storage shed for passenger cars.

MOBILE & OHIO.—This company plans the construction of a brick and stucco passenger station at West Point, Miss., at a cost of about $25,000. The building will have dimensions of 32 ft. by 120 ft.

NEW YORK CENTRAL. — The Junius-Waterloo highway grade crossing south of Junius station, N. Y., is to be eliminated by carrying the road under the New York Central tracks at a cost of about $115,800, without land or damages, according to an order of the Public Service Commission of New York, which has also approved plans submitted by this company for the abolition of Pettys crossing, near Clyde station, Galen, N. Y.

NEW YORK CENTRAL.—The Public Service Commission of New York has amended its order of September 19 relative to the elimination of the Main street crossing, New Hamburg, N. Y. The amended plan calls for carrying the highway over the tracks at the point originally designated, but with some changes in the structure and in the western approaches, and for the extension of a pedestrian subway to serve four tracks instead of two. The total cost of the new plan is estimated at $129,300, exclusive of land and damages.

General plans submitted by the New York Central for the elimination of the Utica-Frankfort state highway and the Morris road grade crossings in the town of Frankfort, N. Y., have also been approved by the New York Public Service Commission.

NEW YORK, NEW HAVEN & HARTFORD.—This company has authorized the construction of a switching lead track at Roxbury, Mass., at a probable cost of $38,000 and the erection of a traveling crane at the Brewery street freight yard, New Haven, Conn., at a cost of approximately $36,000. The Public Service Commission of New York has approved detailed plans and an estimate of cost totaling $72,300 submitted by this company for the reconstruction of a bridge carrying Delafield street, Poughkeepsie, N. Y., over the tracks of the former Central New England railroad.

PENNSYLVANIA.—The Public Service Commission of New York has ordered the removal of Hitcomb, Shreve and Osborne crossings, near Panama and Sherman stations, N. Y. The first two are to be closed and the railroad is to eliminate the third by carrying the highway grade over its tracks.

PENNSYLVANIA.—This company has let contracts to J. Rich Steers, Inc., of New York City, for the construction of foundations for a bridge over the Passaic river at Newark, N. J., at a cost of $695,000, and to the T. J. Foley Company of Philadelphia, Pa., for the construction of an undergrade bridge at James street, Newport, Del., at a cost of $65,000.

SOUTHERN PACIFIC.—This company and the Central Pacific have applied to the Interstate Commerce Commission for a certificate authorizing the construction of a track from Isleton, Cal., to the Golden State Cannery, 2.4 miles.

VIRGINIAN & WESTERN.—A contract has been awarded by this company, a subsidiary of the Virginian, to Boxley Brothers, Orange, Va., for the construction of a 13-mile extension from Mullens, W. Va., to a point on the Guyandot river, near Gilbert. The project will require the excavation of about 700,000 cu. yd. of material, including the driving of four tunnels. It was announced in the *Railway Age* of August 31 that bids were to be received for this work.

WABASH.—This company has been granted a license in Ontario authorizing it to acquire not more than 200 acres of land in East Sandwich at a cost of not more than $250,000 for the purpose of constructing a freight yard and terminal facilities.

WESTERN PACIFIC.—This company has filed with the Interstate Commerce Commission an amended application for authority to build a line from San Francisco through Redwood City to a connection with the present line at or near Niles, Cal., 37 miles, and a branch of 2 miles from Redwood City to the plant of the Pacific Portland Cement Company.

Railway Finance

ATCHISON, TOPEKA & SANTA FE.—*Bonds of Tulsa Union Depot Company.*—The Interstate Commerce Commission has granted authority to this road, the St. Louis-San Francisco and the Missouri-Kansas-Texas to assume obligation and liability as lessees in respect of not exceeding $2,000,000 of first mortgage, 30-year, 4½ per cent sinking fund bonds of the Tulsa Union Depot Company.

ATLANTA, BIRMINGHAM & ATLANTIC.—*Reorganization.*—The Interstate Commerce Commission has issued an order requiring this road, which is successor to the Atlanta, Birmingham & Coast, to report its investment in road and equipment as not exceeding $9,261,043.87. This amount is made up of $5,180,344.07 of preferred stock of the new company issued in partial exchange for outstanding bonds of its predecessor and of $4,080,699.80, the amount of liability assumed by the Atlantic Coast Line in connection with outstanding claims of the old company. The new company had put forth a road and equipment investment of $29,471,859 based upon the Commission's valuation of the properties as of 1914. Following court proceedings which resulted in a finding that the Commission's fixing of the lower valuation without hearing was arbitrary and unlawful, the case was reopened for hearing and the original order was reaffirmed.

BALTIMORE & OHIO.—*Equipment Trust Certificates.*—The Interstate Commerce Commission has authorized an issue of $13,500,000 of equipment trust certificates, to be sold at not less than 94.577 and interest.

BENNETTSVILLE & CHERAW.—*Resumption of Operation.*—In an application to the Interstate Commerce Commission this company asks authority to resume operation over a line between Brownsville and Sellers, S. C., which the commission authorized it to abandon in 1921. The line was then leased to a lumber company for ten years.

BOSTON & MAINE.—*Clayton Law Complaint Dismissed.*—The Interstate Commerce Commission has issued a report dismissing a complaint filed by Edmund D. Codman which alleged violation of section 10 of the Clayton act in a transaction between the railroad company and Dwight P. Robinson & Co, for the designing and construction of a new North station and other terminal facilities at Boston, Mass. The complaint alleged that Homer Loring, chairman of the executive committee of the B. & M., was at the time a stockholder in the construction company; but the report finds that Mr. Loring had made a bona fide disposition of his stock and that held by members of his family, at a sacrifice, before the contract was ratified, to enable the railroad company lawfully to enter into an advantageous contract.

CHICAGO, INDIANAPOLIS & LOUISVILLE.—*Bonds.*—The Interstate Commerce Commission has authorized the authentication and delivery of $1,637,000 of first and general mortgage 5 per cent bonds, to be exchanged for a like amount of 6 per cent bonds.

CHICAGO, MILWAUKEE, ST. PAUL & PACIFIC.—*Abandonment.*—The Interstate Commerce Commission has made public proposed reports by Examiners O. D. Weed and R. R. Molster recommending denial of this company's applications for authority to abandon branch lines from Springfield to Running Water, S. D., 6.71 miles, and from Babcock to Norway, Wis., 15.84 miles.

CHICAGO, ST. PAUL, MINNEAPOLIS & OMAHA.—*Equipment Trust Certificates.*—An application has been filed with the Interstate Commerce Commission for authority for an issue of $390,000 of equipment trust certificates, for which competitive bids are to be asked.

CLEVELAND & PITTSBURGH.—*Bonds.*—This company has applied to the Interstate Commerce Commission for authority to issue $1,574,000 general and refunding mortgage 4½ per cent bonds, to be delivered to the Pennsylvania in partial reimbursement for advances.

DETROIT & MACKINAC.—*Lease.*—This company and the Erie & Michigan Railway & Navigation Company have applied to the Interstate Commerce Commission for authority for a lease by the D. & M. to the Erie & Michigan company of a branch from Alabaster Junction to Alabaster, Mich., 4.27 miles, for five years.

FEDERAL VALLEY.—*Promissory Notes.*—The Interstate Commerce Commission has granted this road authority to issue $32,561.41 of promissory notes to retire maturing notes of the same amount.

GULF, MOBILE & NORTHERN.—*Acquisition.*—This company has applied to the Interstate Commerce Commission for authority to acquire control of the New Orleans Great Northern by exchanging one share of its stock for each 2¾ shares of common stock of the N. O. G. N. It also asked authority to issue $2,727,273 additional stock for the purpose.

GULF, MOBILE & NORTHERN.—*Bonds.*—In an application to the Interstate Commerce Commission this company asks authority to issue and hold in its treasury $3,500,000 of series C 5 per cent bonds, to capitalize expenditures for the acquisition of additional property.

LOUISVILLE & NASHVILLE.—*Bonds.*—The Interstate Commerce Commission has authorized the authentication and delivery of $9,779,000 of first and refunding mortgage 4½ per cent bonds.

LOUISIANA & ARKANSAS.—*New Director Elected.*—T. S. Grayson of Magnolia, Ark., has been elected a member of the board of directors.

MANILA SOUTHWESTERN.—*Abandonment.*—This company has applied to the Interstate Commerce Commission for authority to abandon its entire line from Lunsford to Herman, Ark., 6 miles.

MINNEAPOLIS & ST. LOUIS.—*Receiver's Certificates.*—The Interstate Commerce Commission has granted authority to this company to issue $675,000 of receiver's certificates to extend or renew certificates of like amount which will mature on various dates between October 30, 1929, and February 5, 1930.

MISSOURI-KANSAS-TEXAS.—*Bonds of Tulsa Union Depot Company.*—See Atchison, Topeka & Santa Fe.

MISSOURI PACIFIC.—*Stock.*—The Board of Directors of this road has authorized an issue of $38,659,900 of common stock to be sold to present stockholders at $100 a share, the proceeds to be used to pay back dividends on preferred stock of the road.

MISSOURI & NORTH ARKANSAS.—*Purchase of Controlling Interest.*—At controlling interest in this railroad has been gained by Frank Kell, president of the Wichita Falls & Southern, Wichita Falls, Tex., through purchase in the open market of a majority of the capital stock. Capital stock of the company outstanding totals $3,000,000. The change in the control of the road represents another step in its history which began in 1882 when the Eureka Springs was opened from Seligman, Mo., to Eureka Springs, Ark., 18 miles. The Eureka Springs was purchased by the St. Louis & North Arkansas in 1900 and the latter road was sold under foreclosure and reorganized as the Missouri & North Arkansas in 1906. At the time of that reorganization the road had 126 miles of line. A receiver was appointed in 1912 and the company was reorganized in 1922 after the suspension of operations for nearly a year. In 1927 the road was again placed in the hands of a receiver. At the present time it operates 368 miles of line from Joplin, Mo., to Helena, Ark.

MOUND CITY & EASTERN.—*Securities.*—This company has applied to the Interstate Commerce Commission for authority to issue $1,200,000 of stock and $1,200,000 of first mortgage 6 per cent bonds for the purpose of financing the construction of a line from Leola to Mound City, S. D., 70 miles, heretofore authorized by the commission.

NASHVILLE, CHATTANOOGA & ST. LOUIS.—*Abandonment.*—This company has applied to the Interstate Commerce Commission for authority to abandon three spur lines in Grundy county, Tenn., aggregating about 11 miles.

NEW ORLEANS, NATALBANY & NATCHEZ.—*Acquisition.*—This company has applied to the Interstate Commerce Commission for authority to acquire and operate in freight service under lease a line being constructed by the Natalbany Lumber Company, Ltd., from Grangeville to Slaughter, La., 18 miles.

NEW YORK, CHICAGO & ST. LOUIS.—*Acquisition and Operation.*—This company has been granted authority by the Interstate Commerce Commission to acquire and operate, under lease, the railroad yard of the Northern Ohio Food Terminal, Inc., in Cleveland, Ohio.

NORFOLK & WESTERN.—*Extra Dividend.*—The Board of Directors of this road has declared an extra dividend of $4 in addition to the regular quarterly dividend of $2 on the company's common stock. Both dividends are payable December 19 to stockholders of record November 20. Extra dividends of $2 each have been paid by this company during the past three years.

NORFOLK & WESTERN.—*Final Valuation.*—The Interstate Commerce Commission has issued its final valuation report, finding the final value as of 1916 of the property owned and used for common-carrier purposes to be $236,240,000. The book investment in carrier property, including lands, was $263,585,356, of which, the report says, $134,099,761 represents the par value of securities issued. The cost of reproduction new, exclusive of land, was placed at $255,456,577, and the cost of reproduction less depreciation at $205,482,882.

NORTHERN PACIFIC.—*Final Valuation.*—The Interstate Commerce Commission has issued a final valuation report as of 1917, finding the final value for rate-making purposes of the property owned and used for common-carrier purposes to be $416,290,000, an increase of $3,000,000 over the tentative valuation. Final values of property owned and used by subsidiary companies were found as follows: Duluth Union Depot & Transfer Company, $1,161,565; Minnesota & International, $3,723,400; Big Fork & Northern, $475,000, Centralia Eastern, $151,418; Billings & Central Montana, $165,000. The Northern Pacific books, according to the report, recorded an investment in carrier property, including land, of $491,528,660. With readjustments, this would be reduced to $468,895,859. The cost of reproduction new was placed at $394,093,641 and the cost of reproduction less depreciation at $323,966,495.

PENNSYLVANIA.—*Abandonment.*—This company and the Pennsylvania, Ohio & Detroit have applied to the Interstate Commerce Commission for authority to abandon a branch line from Blue Ash to Montgomery, Ohio, 1.35 miles.

ST. LOUIS-SAN FRANCISCO.—*Bonds of Tulsa Union Depot Company.*—See Atchison, Topeka & Santa Fe.

WHEELING & LAKE ERIE.—*Supreme Court Declines to Review Station Litigation.*—The Supreme Court of the United States on October 23 declined to review the litigation arising from the proposed use by this company of the terminals of the Cleveland Union Terminals Company at Cleveland, Ohio, and the abandonment of its Ontario street passenger station, by denying a petition filed by the Pittsburgh & West Virginia for a writ of certiorari to review a decision of the circuit court of appeals for the sixth circuit which had dissolved an injunction issued by a lower court.

Dividends Declared

Central R. R. of New Jersey.—$2.00, quarterly, payable November 15 to holders of record November 4.

Missouri-Kansas-Texas.—Preferred A, $1.75, quarterly, payable December 31, to holders of record December 14

Norfolk & Western.—Common, $2.00, quarterly; Extra, $4.00, both payable December 19 to holders of record November 30.

Average Prices of Stocks and of Bonds

	Oct. 22	Last week	Last year
Average price of 20 representative railway stocks.	150.71	155.23	121.80
Average price of 20 representative railway bonds..	91.44	90.40	93.73

* * * *

On the New York Central Along the Hudson River

Railway Officers

Executive

J. W. Walsh, general manager of the Rock Island Southern, with headquarters at Davenport, Iowa, has also been elected president.

A. A Hartman has been elected president of the Virginia & Truckee, with headquarters at New York, succeeding **Ogden Mills.**

George McSweyn, treasurer of the Mississippi & Skuna Valley, has been elected vice-president, with headquarters as before at Memphis, Tenn.

Financial, Legal and Accounting

C. D. Wachter has been elected secretary and auditor of the Chicago & Calumet River, with headquarters at Hegewisch station, Chicago.

H. L. Utter, secretary and treasurer of the Missouri Pacific, with headquarters at New York, has retired after 39 years of service with that company. **William Wyer,** vice-president, assistant secretary and assistant treasurer of the Denver & Rio Grande Western, the Gulf Coast Lines, International Great Northern and the Texas-New Mexico, will succeed Mr. Utter as secretary and treasurer of the Missouri Pacific; with headquarters as before at New York.

Operating

C. P. Fisher, assistant trainmaster on the New York division of the Pennsylvania, has been promoted to trainmaster of the Indianapolis division.

H. I. Willett has been appointed superintendent of car service of the Illinois Terminal System, with headquarters at Alton, Ill.

The headquarters of the Kentucky division of the Louisville & Nashville, of which **J. G. Metcalfe** is division superintendent, have been removed from Paris, Ky., to Latonia.

Clyde C. Hayden has been appointed power superintendent of the East Bay Electric division of the Southern Pacific in charge of operation and maintenance of power plant and sub-stations, and with headquarters at Fruitvale, Cal.

Henry Foulkes, supervisor of mail service of the Delaware, Lackawanna & Western, with headquarters at New York, has been appointed superintendent of mail service, with the same headquarters. The position of supervisor of mail service has been abolished.

George H. Mayer, superintendent of telegraph of the Chicago division of the Minneapolis, St. Paul and Sault Ste. Marie, with headquarters at Chicago, has been appointed also superintendent of telegraph of the Duluth, South Shore & Atlantic and the Mineral Range.

W. H. Dick, trainmaster on the Chicago, Rock Island & Pacific at Topeka, Kan., has been promoted to superintendent of the Nebraska-Colorado division, with headquarters at Fairbury, Neb., succeeding **F. A. Bogue,** who has been transferred to the Iowa division, with headquarters at Des Moines, Iowa. **Bluford Johnson,** trainmaster at Herington, Kan., has been transferred to Topeka to replace Mr. Dick.

J. A. Appleton, acting general superintendent of the Lake division of the Pennsylvania, has been promoted to the position of general superintendent of the North Western division, succeeding **Walter S. Franklin,** who has resigned to become president of the Detroit, Toledo & Ironton. **P. L. Grove,** general superintendent of the Lake division, who was granted a leave of absence in June on account of illness, has resumed his duties with the company. **F. L. Dobson,** acting superintendent of the Pittsburgh division, has been appointed superintendent of that division.

Traffic

F. C. Thompson has been appointed district freight and passenger agent of the Missouri-Kansas-Texas Lines, with headquarters at San Francisco, Cal.

J. B. Edmunds, general agent for the Chesapeake & Ohio at Washington, D. C., has also been appointed general agent of the Pere Marquette at the same point.

D. E. Gilbert, division freight agent on the Wabash at Toledo, Ohio, has been promoted to assistant general freight agent, with headquarters at the same point.

F. M. McClure, assistant general passenger agent of the Gulf Coast Lines, has been promoted to assistant passenger traffic manager, with headquarters as before at Houston, Tex.

Noah Webster has been appointed traffic manager of the Gainesville Midland with headquarters at Gainesville, Ga.

N. V. Page, special traffic representative of the Missouri & North Arkansas, has been promoted to assistant general freight agent, headquarters as before at Harrison, Ark.

H. T. Drane, general agent for the Louisville & Nashville at Washington, D. C. has been transferred to Clarksville, Tenn., succeeding **Julian F. Gracey,** deceased.

A. Drahos, commercial agent for the Norfolk & Western at Denver, Colo., has been appointed Pacific Coast agent, with headquarters at San Francisco, Cal., a newly created agency.

C. B. Craig, commercial agent of the New York, Chicago & St. Louis at Fort Wayne, Ind., has been promoted to assistant general freight agent, with headquarters at Buffalo, N. Y., effective November 1.

T. J. Davis has been appointed general agent of the Cleveland, Cincinnati, Chicago & St. Louis, with headquarters at Dayton, Ohio, succeeding **T. P. Stabler,** who retired from active service on October 16.

W. R. Rhodes has been appointed general Eastern passenger agent of the Chesapeake & Ohio, with headquarters at New York, succeeding **C. B. Kincaid,** who has been appointed district passenger agent at Washington, D. C., Mr. Kincaid replaces **E. N. Bailey,** who has been appointed district passenger agent at Richmond, Va.

Engineering, Maintenance of Way and Signaling

Samuel H. Scribner has been appointed assistant engineer of the Boston & Maine, with headquarters at Dover, N. H.

D. E. Gelwix, maintenance assistant to the general manager of the St. Louis-San Francisco, with headquarters at Springfield, Mo., has been appointed division engineer of the Eastern division, with headquarters at the same point, succeeding **E. L. Anderson,** who has been appointed assistant division engineer of that division.

Douglas M. Burckett has been appointed electrical engineer of the Boston & Maine, with headquarters at Boston, Mass. He will have charge of the design and preparation of plans, specifications and estimates and the inspection during installation and preliminary operation of all new electrical and mechanical installations.

Paul Sterling, assistant to the engineer, maintenance of way, of the New York, New Haven & Hartford with headquarters at New Haven, Conn., has been appointed assistant to the Chief engineer with the same headquarters; **P. R. Leete,** assistant valuation engineer with headquarters as before at Boston, Mass.; **L. E. Little,** assistant corporate engineer has been appointed corporate engineer with headquarters as before in Boston.

W. R. Gillam, who has been promoted to district engineer of the Northern lines of the Illinois Central, with headquarters at Chicago, has been connected

with the engineering department of that road for nearly 30 years. He entered railway service on November 1, 1899, as a chainman on the Chicago division of the Illinois Central. From 1901 to 1916 he occupied successively the positions of rodman on the Chicago division, assistant engineer on the New Orleans and on the Vicksburg divisions, rodman on the Louisville division, assistant engineer on the Freeport and on the Chicago divisions, resident engineer of the construction department at the Atoka-Kerrville cut-off, assistant engineer in the construction department at Baton Rouge, La., on the Memphis division and in the valuation department at Memphis, Tenn. On December 10, 1916,

W. R. Gillam

Mr. Gillam was appointed division roadmaster of the Memphis division, where he remained until five years later when he was appointed assistant engineer in the maintenance of way department at Chicago. From 1921 to 1923 he served as assistant engineer in the office of the chief engineer and as assistant engineer on the Chicago lake front construction, then being appointed assistant roadmaster of the Chicago terminal. Mr. Gillam was appointed division roadmaster of the Springfield division on February 1, 1925, and was transferred to the St. Louis division at Carbondale in March, 1929, where he was located until his promotion to district engineer.

Mechanical

C. G. Brown, assistant master mechanic on the Philadelphia division of the Pennsylvania, with headquarters at Harrisburg, Pa., has been promoted to master mechanic at Indianapolis, Ind.

T. W. Kennedy, air-brake, lubrication and car-heating engineer of the Illinois Central, with headquarters at Memphis, Tenn., has been appointed air-brake and car-heating instructor, succeeding **F. H. Hinton**, who has been relieved at his own request. **W. L. Jones** has been appointed air-brake lubrication and car-heating engineer, with headquarters at Memphis, replacing Mr. Kennedy. The title of **A. J. Pichetto**, assistant general air-brake, lubrication and car-heating engineer, with headquarters at Chicago, has been changed to air-brake, lubrication and car-heating engineer.

Purchases and Stores

Frank W. Taylor, whose jurisdiction as purchasing agent of the Southern Pacific, with headquarters at San Francisco, Cal., has been extended to cover

F. W. Taylor

the activities formerly handled by the general purchasing agent, has been connected with railway purchasing and stores work for nearly 44 years. He was born at Campobello, N. B., on August 5, 1867, and entered railroad service in December, 1885, as a chainman on the Union Pacific at Laramie, Wyo. After a short period of service in the engineering department he became a clerk in the stores department at Laramie and was later advanced to chief clerk and to division storekeeper at that point and at Pocatello, Idaho, on the Oregon Short Line. In 1907 Mr. Taylor was promoted to general storekeeper of the Oregon Short Line, with headquarters at Pocatello, where he remained until 1911 when he was appointed general purchasing agent of the Pacific Electric, with headquarters at Los Angeles, Cal. He was appointed purchasing agent of the Southern Pacific in 1917, a position he still occupies with increased jurisdiction.

Obituary

J. B. Yellowley, trainmaster on the Illinois Central with headquarters at Baton Rouge, La., died of pneumonia on October 22, at a hospital at Ann Arbor, Mich.

Lester A. Robinson, who recently retired as passenger traffic manager of the New York Central, on account of ill health, died on October 18 at his home in Irvington, N. Y.

Henry Eisele, former assistant superintendent of the locomotive department of the Wabash, who retired from active service in 1926, died at his home in Decatur, Ill., on October 8 after an illness of three years. Mr. Eisele had been connected with the mechanical department of the Wabash for nearly 28 years, beginning in August, 1898, when he entered railway service as a machinist apprentice at the Springfield (Ill.) shops. Following his apprenticeship he became a machinist and in August, 1905, he was advanced to gang foreman, two years later being promoted to general foreman at Fort Wayne, Ind. In October, 1913, Mr. Eisele became general foreman of the main locomotive shop at Decatur and in December, 1917, he was promoted to superintendent of the shop. He was promoted to assistant superintendent of the locomotive department on the staff of the superintendent of motive power of the Wabash, with headquarters at Decatur, on April 1, 1920, a position he held until January 28, 1926, when he was compelled by ill health to accept a leave of absence.

Francis W. Johnstone, former superintendent of motive power and machinery of the **Mexican Central** (now part of the National of Mexico), with headquarters at Mexico, D. F., died at San Diego, Cal., on October 17 at the age of 82 years. Mr. Johnstone was born at Charleston, S. C., and entered railway service in 1874 as a draftsman at the Wilmington (Del.) shops of the Philadelphia, Wilmington & Baltimore (now part of the Pennsylvania). Later he served with that road as a machinist and until 1884 he was engaged successively as a draftsman and machinist on the Panama Railroad at Aspinwall, as foreman of the shops at Aspinwall, as assistant master mechanic and master mechanic at Aspinwall, as master mechanic of the Springfield, Jackson & Pomeroy (now part of the Detroit, Toledo & Ironton), and as master mechanic on the Mexican Central. In April, 1884, Mr. Johnstone was promoted to superintendent of motive power and machinery of the Mexican Central, a position he occupied until his retirement from railway service in August, 1901.

Edward Langham, formerly general purchasing agent of the Canadian National, with headquarters at Toronto, Ont., died in that city on September 4. Mr. Langham was born in England 77 years ago and entered railway service in 1875 on the New York Central at Rochester, N. Y. After service on several small coal railroads in Pennsylvania, he entered the employ of the Canadian Pacific in 1882 in the handling of construction material at Winnipeg. From 1886 to 1902 he was engaged successively in handling construction material for the Canadian Pacific in Maine and at Calgary, Alta., and for the Toronto Railway, as purchasing agent for the Birmingham (England) Tramways, and as material agent for the Canadian Northern (now part of the Canadian National) at Winnipeg, Man. In 1902 Mr. Langham was promoted to purchasing agent of the Canadian Northern at Winnipeg, 15 years later being promoted to general purchasing agent. He retired as general purchasing agent of the Canadian National in December, 1920.

Railway Age
Motor Transport Section
Devoted to the Co-ordination of Railway and Highway Service

Vol. 87 October 26, 1929 No. 17

The Contest for Certificates

FEW of the railways were quick to adopt the motor coach when it first began to take its place in the transportation business. Literally hundreds of individuals or groups independent of railway or other affiliations, however, saw in the motor coach an opportunity to engage in a form of the transportation business which had a certain promise of profit. Under the system of regulation in effect in nearly all of the states, these independent operators were compelled, before being able to operate motor coaches, to secure certificates of convenience and necessity from the particular commissions having jurisdiction in the territory they proposed to serve. These operators have been at once the victims and the beneficiaries of this form of regulation, for while they may have had difficulty in the first instance in securing such certificates, they have to a great degree been protected against competition from other motor coach operators after securing the certificates, owing to the somewhat monopolistic rights which most of the state commissions give in the certificates which they grant.

So long as they had no intention to operate motor coaches, the railways were not concerned with the monopolistic aspect of certificates granted to motor coach operators in their territories. To be sure, the railways have opposed the granting of many operating certificates, in most instances on the grounds that adequate service was being rendered by their trains, but in comparatively few instances has this contention prevented the state commissions from permitting motor coach operators to compete with the railways. The result is that virtually all of the "good" highway routes in the United States, and by this is usually meant routes parallel to railway lines, are now covered by motor coach operating certificates, held largely by independent companies.

During recent months a number of the railways have proposed to engage in motor coach operations on a scale comparable to the size of their railway systems. At once, they have been confronted with difficulty in securing permission to operate motor coach service co-ordinated with their train service, because of the fact that the highways over which they propose to operate are already being used by the motor coaches of independent companies holding the somewhat monopolistic certificates. In many instances, the railways have met the situation by buying out the independent companies in order to secure their certificates, and as a rule large prices have been paid for them. In some cases, the prices asked for their properties, including their certificates, by independent lines have been so exorbitant that the railways have refused to pay them, and for this and other reasons, have appealed to the state commissions for directly-granted certificates.

This has raised two questions which sooner or later must be answered. First, should a motor coach operating permit convey to its holder a monopoly of the business of furnishing motor coach transportation on the route which it covers? Second, can the railways fairly be prevented from carrying out plans for the co-ordination of railway and highway service which are in the interest of their patrons?

Unregulated competition has little to be said in its favor. Regulated competition, however, would appear to be justifiable at least insofar as operation over heavily-travelled routes is concerned. Certain of the state commissions have recognized this by permitting more than one company to operate motor coaches between cities of fair size. The contention of the holders of the original certificates, of course, is that they have pioneered in their territories and deserve protection from newcomers who may attract some of their business away from them. There is a certain amount of justice in this claim.

On the other hand, when a steam railway, which is much more of a pioneer in transportation than any motor coach line, desires to operate motor coaches over the highways in its territory, it certainly seems to have a very sound and a very strong argument on its side. In the final analysis, the principle objective is the best possible transportation service. There is no question that the best transportation service is obtained by full co-ordination of the various kinds of transportation facilities available. Real co-ordination of railway and motor coach service can never be obtained so long as they are separately controlled.

Admittedly, the railways were slow to take an active interest in the motor coach. Those that only recently

have adopted it have paid a heavy price for their delay, and those that propose to operate motor coaches in the future will pay a proportionately heavier price as time passes. But whatever the price, an increasing number of railways now wish to engage in motor coach operation, and it seems fair not only to them but to their patrons that they should be permitted to do so.

Two Sides to the Question of Uneconomic Competition

THE *Railway Age* has always been opposed to uneconomic competition among the various agencies of transportation. Each has a field where it is economically supreme and where it should move the traffic. When one agency enters a field which properly belongs to another, waste occurs, which means loss not only to the competitors, but to the country as a whole.

That there has been a great deal of this unjustifiable competition goes almost without saying. Probably much of it has been unavoidable, due to the rapid expansion of the use of automotive vehicles and the necessity of their finding their true sphere in the transportation scheme largely by the trial and error method. Nevertheless, it is to the interest of all concerned that competition be speedily ended with the superior agency the acknowledged victor.

At the same time, the fact should not be overlooked that the matter of uneconomic competition is not entirely one-sided. The offending agency has not always been the automotive vehicle. For example, the handling of perishables over long distances by motor truck probably constitutes uneconomic competition with the railroads.

On the other hand, what are we going to say of the railroad which operates a train to handle traffic which a motor truck or motor coach could unquestionably serve as well or better, and at a fraction of the cost? Is not failure to use the newer medium of transportation in such a case an example of favoring the less efficient method for a particular task resulting in waste which is just as deplorable as the unjustifiable invasion by the motor vehicle of a field which the railroad can serve more economically,

Railroad men will be performing a valuable service, not only for their own companies but for the national welfare as well, if they will fight uneconomic competition among the various agencies of transportation wherever they find it. A valiant stand against the invasion by motor vehicles of a field which properly belongs to the railway is commendable and necessary. At the same time, a careful study by the railways of traffic situations which they could care for more efficiently by substituting motor vehicles for rail handling offers the solution to another aspect of the same problem, which aspect should not be ignored.

The Toronto Meeting of the Motor Transport Division

THE Motor Transport Division of the American Railway Association, after a number of months without a meeting will convene again at Toronto, Ont., on November 12-15. This meeting should have a larger attendance and better program than any of those previously held by this division, and there are good reasons why this is expected to be the case.

This year has seen the most extensive advances which have yet been made in the co-ordination of railway and highway service, and this is the subject in which the Motor Transport Division is primarily interested. More railways are now engaged in motor coach and motor truck operation, or are about to engage in such operation, than ever before, and this means that more railway officers have a direct personal interest in the problems which come up for discussion at the Motor Transport Division meeting. This should ensure an attendance larger by far than that at any previous meeting of the division.

And for the program, the committees of the division have now had an opportunity to become fully organized and to spend the time necessary to prepare complete reports on the subjects assigned to them. This unfortunately, has not been the case at previous meetings of the division. Furthermore, new subjects for discussion at the Toronto meeting have been suggested by events which have taken place during the last eight months. During this time railways have taken substantial interests in large and previously independent motor coach operating systems. Others have begun to make a real trial of long-distance motor coach service. Furthermore store-door collection and delivery service for freight have gained a real foothold. These and other events of the past eight months should provide ample opportunity for keen discussion.

A rearrangement of the program schedule should also stimulate the interest in it. Instead of holding the open meeting on the last day of the four-day session, as has been the case at previous meetings of the division, the open meeting at Toronto will be held on the second day, and this will be a joint meeting of the Motor Transport Division with the Transportation Section of the Society of Automotive Engineers. These two organizations have much in common, and a joint meeting of their delegates should be mutually advantageous.

The officers of the division hope that the railways which constitute its membership will send substantial delegations of their officers to the Toronto meeting. Motor transportation, as a part of the whole scheme of transportation in which the railways are concerned, is a subject of interest not alone to officers of any one department of the railways. The co-ordination of motor transportation and railway transportation is a job which concerns the officers of many departments of the railways.

How Much Should Be Spent for Repairs or Overhaul?

A QUESTION that always arises in the mind of a fleet superintendent, when extensive repairs or overhaul of any unit of his motor vehicle equipment are contemplated is, "How much money can I spend on this particular piece of equipment and still keep it a profitable investment?" This question may arise at any time in the life of a vehicle, which may be seriously damaged in an accident while comparatively new, or may need a complete overhaul due to long and hard service. With motor coaches, the factor of obsolescence of design enters prominently; motor trucks, however, can be used until they are worn out.

A well-known company operating a large fleet of trucks in New York uses the following method: Trucks costing more than $4000 are estimated to have a life of eight years, with a salvage value at the end of that time of $600. If repairs are necessary at any time during the estimated life of the vehicle, their total cost must not exceed the amount of the initial investment remaining to be amortized. For instance, if the truck cost $5,000 and is six years old, this allowance will consist of the depreciation figure for two years, $1,100, plus one-third of the salvage value, in this case $200, giving a total of $1,300. If the vehicle needs repairs after it has been fully amortized, an amount not exceeding one-third of its salvage value is the maximum amount that can be spent. If this will not put the vehicle in safe, running condition, it is scrapped.

Of course the primary consideration should be, "Will the repairs considered extend the profitable life of the vehicle enough to justify the expense of making them?" This will always remain a matter of judgment on the part of the fleet executive. But the method outlined has the advantage of fixing a definite point beyond which repairs are not considered economical.

Communication

What Should Be the Basis of Taxation?

NEW YORK, N. Y.

TO THE EDITOR:

The article in the *Motor Transportation Section* of July 27 entitled "Are Motor Coach Taxes Too High?," by L. A. Rossman is very interesting in that it presents what is apparently an extreme viewpoint in behalf of the motor coach. A similar extreme view from the railroad standpoint would probably favor taxing the motor coaches off the highways altogether.

Is it not probable that, with this question as with every other, a sane policy lies somewhere between these extremes?

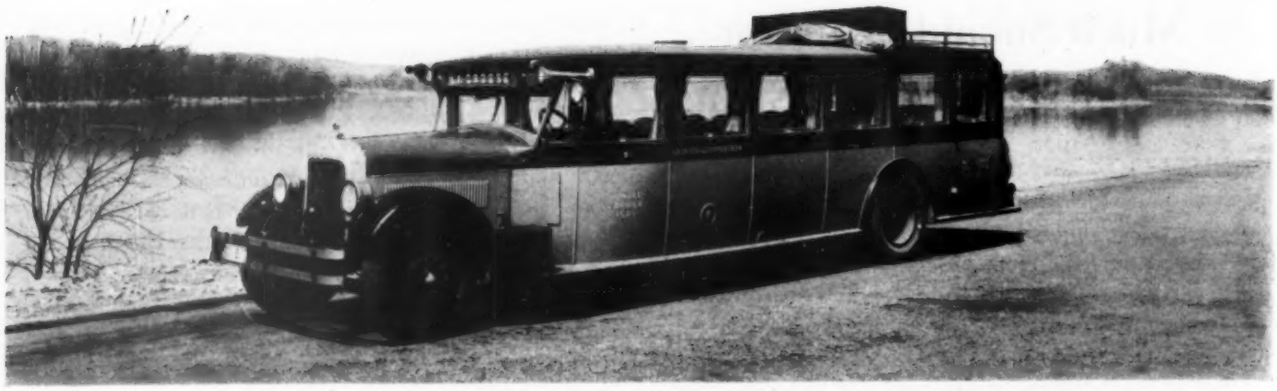
The state is put to great expense to provide highways and other facilities for motor vehicles. Funds to provide such facilities must be provided from some source. Ideally these funds should come entirely from the users of the highways. As a practical matter, however, as far as private automobiles are concerned, with their present wide-spread ownership, it can make little difference to the average motor vehicle owner whether he pays his share of highway expenses directly as a motor vehicle owner or indirectly as an owner of real estate or as a rent-payer. With the commercial user, however, the case is entirely different. The commercial user plainly makes a much greater use of the highways in proportion to his contribution as a taxpayer on real estate than does any private automobile owner. The commercial highway user, therefore, can fairly be asked to pay not only the general property tax and such motor vehicle taxes as private users pay, but *in addition* a sum equivalent to a fair rental charge for the public property.

The question is not simply a matter of raising public revenues, but, more important, it involves the prevention of waste and the preservation of the national income. It is essential to national prosperity that every transportation task be performed by that agency which can do it most economically. Business seeks the agency, however, which offers the most attractive rates, service considerations being the same. The only method whereby each transportation task can in every case be directed to the agency best qualified—from the standpoint of general economic welfare—to handle it is to assure that the rates charged by every transportation agency include the *total economic cost of providing the service.*

Mr. Rossman says that the average motor coach tax is from 4 to 5 per cent of the earnings and that this is comparable to the rate paid by other transportation agencies. If this is true, then average motor coach taxes are too low—since motor coaches secure a right-of-way at public expense, which other forms of transportation, i. e., the railways, have to pay for *in addition* to their taxes.

I sympathize entirely with the view that the wide disparity in motor coach taxation among the various states is unsatisfactory and that some of the taxation is undoubtedly uneconomic—levied on motor coaches because they are easy marks rather than in the pursuit of a logical theory of taxation. This condition can only be overcome, however, when general complaints against high and unfair taxation are superseded by a search for a logical theory of taxation by which the fairness of specific levies may be judged. Such a theory, I submit, should be somewhat as follows: *Taxation for commercial motor vehicles should be levied on the same basis as that of other transportation enterprises, plus a sum equivalent to a fair rental charge for the use of public property as a place of business.*

Not even a beginning can be made in carrying out such a plan, however, until we learn what highway costs really are. Since our highways have become economically so important, should not the various states set up accounts for them comparable to those of a privately owned utility?—an investment account subdivided in detail, which account would be charged each year with depreciation or increased by new capital expenditures; a highway maintenance expense account, subdivided in considerable detail by sections of highway, which account would also be charged with a theoretical real estate tax. Adding to the total of the highway expense account a fair charge representing interest on the investment and depreciation would give a total figure for the cost of highway service, allocated by important subdivisions of highway. Periodic traffic checks could readily estimate the total average annual ton-miles on a given section of roadway. A fair rental charge to the commercial highway user could therefore be set at the same ratio of total highway expense as his average ton-miles would bear to total ton-miles of all vehicles, with perhaps a sliding scale charge to encourage speeds approximately the same as those maintained by private automobiles. If such a charge were levied in addition to regular taxation, then wasteful methods of transportation would be obviated. Until some logical taxation theory is evolved and put into practice, hit and miss methods may be expected to continue—with some levies ridiculously excessive and others just as absurdly inadequate.—VERITAS.



Type Y Yellow Parlor Coach Operated by the LaCrosse & Southeastern

Short Lines Find Motor Coaches Useful

Survey shows that 35 smaller steam railways are operating total of 124 highway motor vehicles for transportation of passengers

THE Class I railways whose motor coach operations were tabulated in the *Motor Transport Section* of the *Railway Age* of September 28 are not the only ones which have adopted the motor coach for the transportation of their patrons. A survey just completed through the co-operation of the American Short Line Railroad Association, indicates that 35 short line railways are also operating motor coaches, the total number of such vehicles operated being 124.

Most of the short line railroads are operating five motor coaches or less, but a few have highway operations of larger size. The East Tennessee & Western North Carolina, for example, operates 15 motor coaches; the La Crosse & Southeastern has 12 motor coaches in service, the Nevada Central has 9, the Copper Range, 8 and the Virginia & Truckee, 6.

The names of the short line railways operating motor coaches and the number of such vehicles which they now have in service are shown in the tabulation.

Report Results of Operations

In order to determine to what extent the member roads of its association are using motor vehicles and what results they are securing, the American Short Line Railroad Association addressed an inquiry to them. Although most of the short line roads advised that they are not operating motor coaches, those which did report such operations indicated with few exceptions that their operations have been successful.

The Cape Fear Railways operate a motor coach line between Fayetteville, N. C., and Fort Bragg, using four 21-passenger, city type motor coaches. This company finds that the operation is economical and satisfactory, the motor coaches being operated at a cost of approximately 16.6 cents per motor coach mile.

Both the Chicago, South Bend & Northern Indiana and its subsidiary company, the Southern Michigan, operate motor coach services in connection with their railway operations. In some instances, the motor coach service is an extension of the rail lines, and in other instances, it supplements the railway service. The company reports that one of its lines, operating between South Bend, Ind., and Niles, Mich., has shown a small profit, while traffic on the rail line has materially decreased. While the motor coach operation between South Bend and Elkhart has failed to earn a profit,

Motor Coaches Operated by Short Line Railways

Railway	No. of Motor Coaches Operated
Alabama, Tennessee & Northern	2
Amador Central	1
Cadiz	2
Cape Fear	4
Chattahoochee Valley	1
Chicago, South Bend & Northern Indiana	5
Copper Range	8
Cowlitz, Chehalis & Cascade	5
Dardanelle & Russellville	3
Delaware Valley	5
Doniphan, Kensett & Searcy	1
Due West	1
East Tennessee & Western North Carolina	15
Lackawanna & Wyoming Valley	5
La Crosse & Southeastern	12
Laurinburg & Southern	1
Little River	1
McCloud River	2
Middletown & Unionville	2
Minnesota Western	4
Narragansett Pier	5
Nevada Central	9
Pacific Coast	5
Pajaro Valley Consolidated	2
Paris & Mt. Pleasant	1
Prattsburgh	1
Quebec, Montreal & Southern	3
San Francisco, Napa & Calistoga	2
San Joaquin & Eastern	4
Tennessee & North Carolina	1
Tennessee, Kentucky & Northern	2
Verde Tunnel & Smelter	1
Virginia & Truckee	6
Wrightsville & Tennille	1
Yreka	1
Total	124

the railway lines there have practically held their own.

The Cowlitz, Chehalis & Cascade, through the Twin Cities Bus Company, operates motor coaches in the vicinity of Chehalis, Wash.

The Dardenelle & Russellville has purchased the capital stock of the Dardanelle Transfer Company, which it will use as a subsidiary to carry on a motor coach and truck service parallel to its railway line.

Motor Coach Reduces Operating Expenses

The Doniphan, Kensett & Searcy reports that it has been using a motor coach for more than a year in handling passengers between Kensett, Ark., and Searcy, a distance of approximately five miles. This is in replacement of regular passenger trains which made Missouri Pacific train connections at Kensett. The company has found that it is difficult to determine the exact results of the operation, but it is satisfied that while the motor coach itself does not make money, and in fact, that it is hard to keep its expenses within its revenue, yet the reduction of train service to one round trip a day, made possible by the motor coach substitution, has substantially reduced the operating loss on that service. This company finds that for short passenger hauls, and fair road conditions, motor coach operation is much cheaper than train operation.

The motor coach has solved a problem for the Due West Railway. For more than four years it has been operating a coach between Due West, S. C., and Donalds. This is a combination coach seating 15 passengers, with reversible seats so that the body can be used for the transportation of express, mail and light freight, when necessary. The coach also makes special trips for light loads of freight in addition to its regular trips. "The motor coach is the solution," says this railway.

One of the largest short line railway operators of motor coaches, the East Tennessee & Western North Carolina, has been co-ordinating railway and highway service for more than two years. Through a subsidiary, the E. T. & W. N. C. Motor Transportation Company, it is operating 15 motor coaches and a number of trucks over the highways parallel to its railway lines. Eleven of the motor coaches are assigned to regular daily schedules, covering approximately 2,000 miles daily. The company reports that its operation of motor coaches has been very successful.

The Lackawanna & Wyoming Valley operates five motor coaches. One of its lines extends from Pittston, Pa., to Moosic, a distance of approximately six miles, this line paralleling the railway line of the company. In addition, it operates a line between Pittston and Scranton, which act as a feeder to the railway at Pittston. The company reports that the business handled by the motor coaches is not heavy, but is substantially sufficient to pay operating expenses.

Motor Coaches Attract Traffic

Another comparatively large railway operator of motor coaches is the La Crosse & Southeastern, which carries on its highway service through a subsidiary, the La Crosse & Southeastern Transportation Company. It established its first motor coach line on May 1, 1926, with coaches operating between La Cross, Wis., and Madison. Since that time the service has been greatly extended, the company's motor coaches now operating from La Crosse to Dubuque, Iowa, to Preston, Minn., and to Lanesboro, Minn., as well as to Madison. Its highway system covers approximately 400 miles of highways, accumulating approximately 1800 motor coach miles daily. Since the establishment of the motor coach service, which has enjoyed an increasing traffic, the passenger earnings on the La Cross & Southeastern have dwindled to practically nothing, due largely to the "much better service" given by the motor coaches, both in speed and in comfort.

The Laurinburg & Southern has not had such a successful experience in its efforts to provide a passenger

Middletown & Unionville Motor Coach at Middletown, N. Y.

service which will earn a profit. It discontinued its passenger train service in November, 1923, substituting a gasoline rail motor car. On July 1, 1928, this rail car in turn was discontinued and a motor coach, operating over the highway between Laurinburg, N. C., and Raeford, was substituted. The company reports that none of these three operations has been successful financially.

The McCloud River Railway is operating motor coaches to handle passengers and mail between Mt. Shasta and McCloud. Motor coaches have replaced two passenger trains, the company now operating only one passenger train daily between these points.

The Middletown & Unionville operates motor coaches between Middletown, N. Y., and Sussex, N. J., this line paralleling the railway line between Middletown and Unionville. The company has not found the operation profitable, owing to the fact that an exceptionally large number of automobiles are owned by residents in its territory.

Increased Earnings from Highway Operations

The Narragansett Pier Railroad purchased its first motor coach in 1925. It bought an additional coach in 1926 and two more in 1928, in the same year buying out a competitor and taking over his equipment. The company now owns and operates five motor coaches, and has a franchise from the Rhode Island Public Utilities Commission to operate motor coaches from an intermediate station on its line, to Providence, R. I., a distance of 35 miles. Instead of carrying passengers a few miles on its own railroad and then turning them over to a connecting line, the company now carries these passengers all the way to Providence, and at the same time furnishes service to two villages which previously had no transportation facilities. During 1928, this company's motor coaches covered 122,515 miles and carried 38,128 passengers, revenue from whom amounted to $35,243. This amount was three times as much as the railway's passenger revenue. It reports that its business this year is 12 per cent greater than last year, and the company expects to do a gross business with its motor coaches of $45,000. This amount will be approximately four times as much as its railway passenger revenues and approximately the same as its railway freight revenues.

The Prattsburgh Railway is operating a motor coach between Prattsburgh, N. Y., and Bath, a distance of 16 miles. The operation is carried on by a subsidiary company, and two round trips daily are made over this route. The motor coach takes care of part of its mail and express traffic, all of which was formerly handled by train, and has permitted the discontinuance of some passenger train service on the railroad. Also better connections are now made by the motor coach.

The Pacific Coast Railway on April 1 of this year, purchased the franchise and equipment of an independent motor coach line operating between Santa Maria, Cal., and Guadalupe. The acquisition of the motor coach line enabled the company to curtail part of, and at some seasons of the year to discontinue entirely, its railway passenger service. Since the operation is comparatively new, the company has arrived at no conclusion regarding the savings in operating expenses made possible by the motor coach operation, but it anticipates that these will be considerable.

Expanding Operations on Highways

The Virginia & Truckee already has two motor coach lines in operation and is about to establish a third. Although it believes that motor coach operation is a necessity to hold passenger business, the company's experience has not been a profitable one, but it feels that the highway operation has prevented the loss of more revenue through the diversion of business to competitive lines.

The Wrightsville & Tennille, together with its associated companies, the Louisville & Wadley and the Wadley Southern, is operating motor coach lines through a subsidiary, the Short Line Motor Transport Company. This company owns one motor coach which is operated over two routes, one between Wadley, Ga., and Louisville, and the other between Wadley and Swainsboro. The company purchased a specially constructed motor coach designed to handle passengers, baggage, mail and express. This coach has enabled the railway to discontinue 702 miles of railway train service per week. It reports a small loss from the motor coach operation itself, because of the short distance covered and the general use of private automobiles, and also on account of the competition of another motor coach line, but states that the saving on account of the reduced steam train service makes the motor coach operation profitable as a whole.

The Yreka Railroad is operating a 16-passenger motor coach and has found it very satisfactory. The coach meets passenger trains at Montague, Cal., and is used exclusively for carrying passengers.

The Santa Maria Valley does not operate motor coaches since it is not a passenger carrying line, but it considers trucks as being "of vital importance," and as a consequence, has organized a subsidiary company to operate motor trucks for the transportation of freight to and from the railway line.

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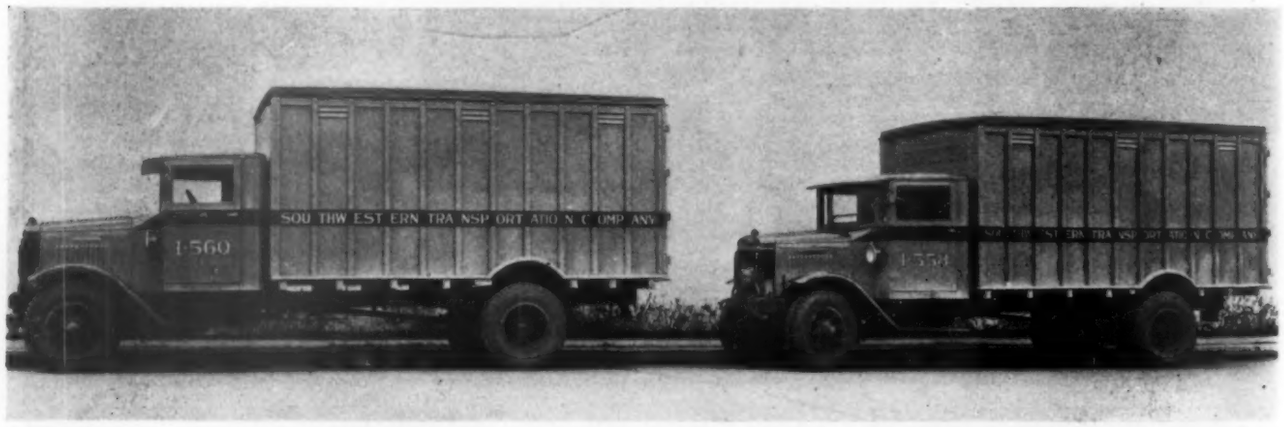


Motor Trucks in Highway Freight Services of Cotton Belt

The New York Central Is the Largest Railway Truck User

How The New York Central Uses Motor Trucks

Motor vehicles play important part in freight transportation operations of system—Used in six distinct ways

By F. C. Jerome

General Freight Agent, New York Central

FOR a number of years the New York Central has made extensive use of motor trucks, tractors and trailers in the handling of freight shipments. The New York Central Lines themselves are not in the trucking business and do not own any of the trucks used in the transportation of commercial freight. They do, however, through contracts with independent motor truck operators, handle a considerable tonnage of freight by motor trucks, tractors and trailers, when through the use of such service freight can be moved more expeditiously and more economically.

The motor trucking activities of the New York Central Lines may be classified under six principal headings as follows:

(1) Station to station hauls in lieu of way freight trains.
(2) From stations on one division, by cross haul, direct to a station on another division, to avoid rehandling at an intermediate transfer or circuitous movement.
(3) From smaller to larger stations to make possible straight carloading with consequent improved time and saving in expense.
(4) Haul from a central delivery station to small outlying stations where final delivery is made to the consignees.
(5) Interchange between railroad and steamship lines.
(6) Trucking of unit containers for l.c.l. merchandise and carload coarse commodities.

In addition to these uses of the motor truck, the New York Central, for about three years, has been trucking carload freight to a considerable extent in New York City, such freight being handled in this way instead of by lighter, to and from private or public piers in the New York lighterage district. This service has been carried on through contracts with a number of truck

owners and operators. Through this installation of motor trucking service between rail termini and such public or private piers at the expense of the railroad, and from and to such piers and the places of business of consignees or shippers at the expense of the shippers or consignees, the railroad has been able to give more expeditious service with monetary saving both to the carrier and to the public.

This trucking in lieu of lighterage by the New York Central, together with the so-called constructive station trucking service of other carriers, was stopped with the close of business on September 24 under the recent decision of the Interstate Commerce Commission, Docket No. 19715. In the meantime, there is being worked out a substitute plan.

Typical Operations

To illustrate the various ways in which the New York Central is using motor vehicles in the transportation of freight, a few typical operations will be mentioned. The New York Central has found that, through contracts with truck operators, it is able to effect economies in transportation costs and also to render better service between shipping points and destinations in certain instances where the distance is not too great, by hauling freight in motor trucks rather than in the regular train service. This form of trucking is a station to station movement. For example, freight is handled by motor truck to and from points on the Harlem division and on the Hudson division near New York instead of by way-freight trains; and in the same way, freight is handled by motor truck between a number of points in upstate New York, as in the case of the operation over the Falls road east and west of Medina. This kind of service makes possible a saving in freight train operation, even to the extent of the elimination of a freight train in its entirety, and in addition it means much improved service to all of the stations affected.

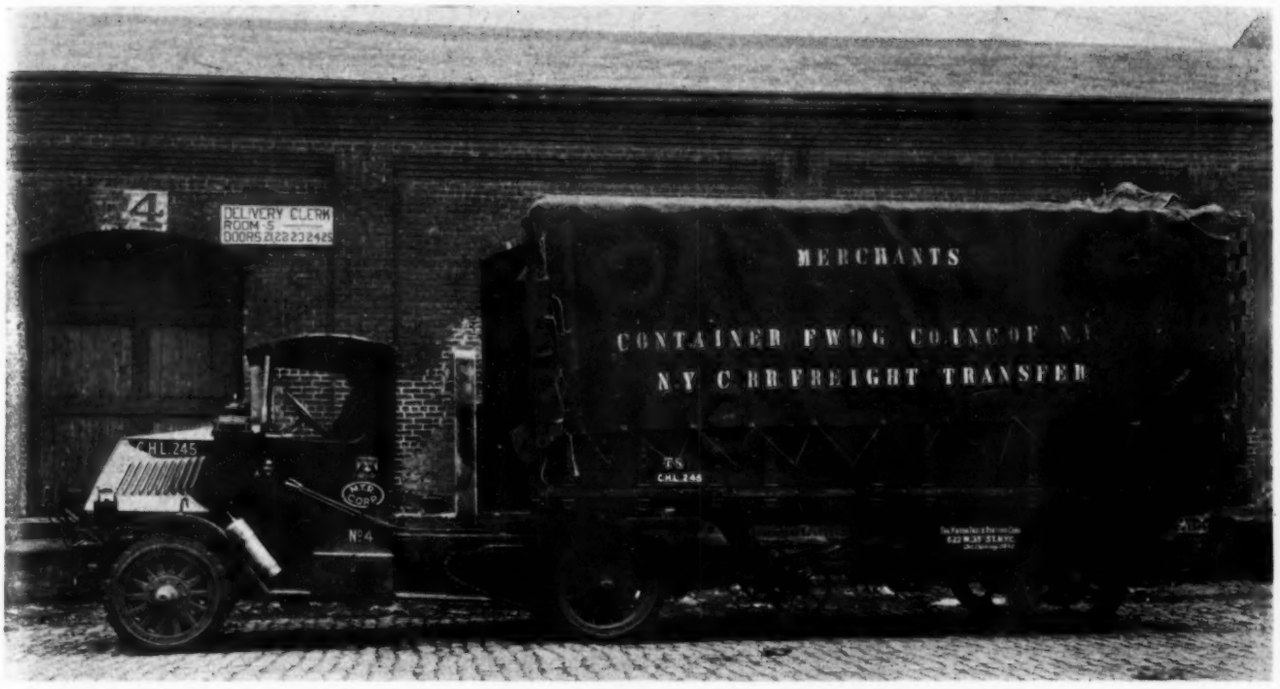
To illustrate the cross-haul service from one division to another, to avoid rehandling at an intermediate transfer station, we carry freight by motor truck from Mt. Vernon, N. Y., to Yonkers, that is, between the Harlem division and the Hudson division. The highway distance between these points is approximately five miles. By handling such freight in motor trucks, we avoid the necessity of bringing the freight down through the Westchester avenue crossover from the Harlem division through the Mott Haven yard to the Hudson Duyvil, an operation most expensive and subject to much interference due to heavy passenger train service in the territory affected.

Enables Straight-Car Loading

Trucking from the smaller to the larger stations to make possible straight-car loading has benefits which are perhaps obvious. It makes possible the elimination of the large number of cars loaded on transfer and maximum utilization of station facilities together with an increase of straight cars to destination. In New York, for example, l.c.l. freight is largely handled by truck and trailer operations, carried on by contract truckmen, from the smaller stations and the North river and East River piers to the rail terminal at Thirty-third street and Eleventh avenue. It is thus possible to concentrate the freight in through cars to and from a very much greater number of points than could possibly be done at the several individual stations and piers. This, of course, results in a much heavier loading of cars, avoids the cost of rehandling at interior transfer houses, saves car detention at such transfers, avoids possible damage through the additional handlings of the freight, and furnishes a much more satisfactory service to the shipping public, since shippers served by the small stations are given service equal to that provided for shippers at the larger stations.

The fourth of the principal uses of motor trucks by the New York Central is simply a reversal of the kind of operation provided for under the third heading.

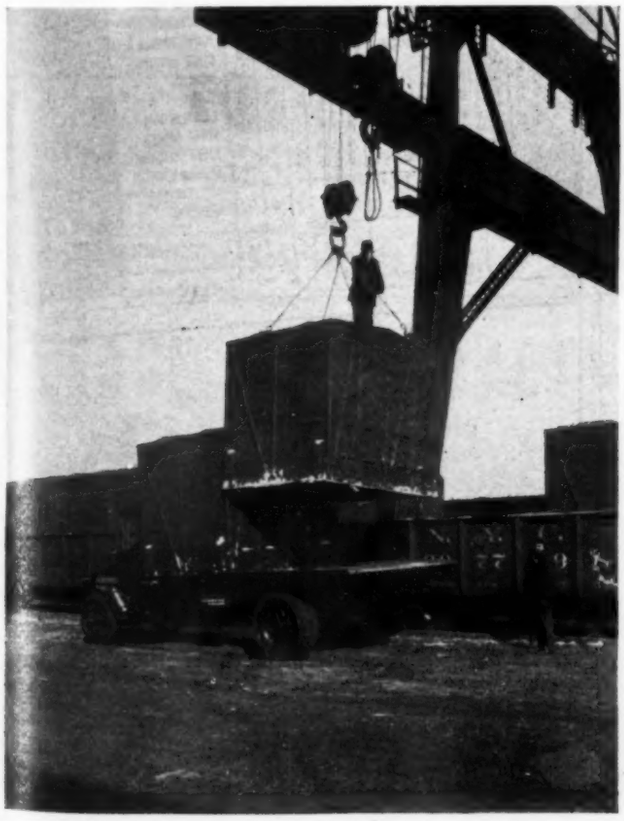
Trucks Play an Important Part in the New York Central's Freight Service



Tractor and Trailer in New York City Transfer Service

Thus, inbound freight is brought to larger stations by train and there loaded into motor trucks or trailers for delivery to smaller stations conveniently located with respect to the places of business of the consignees.

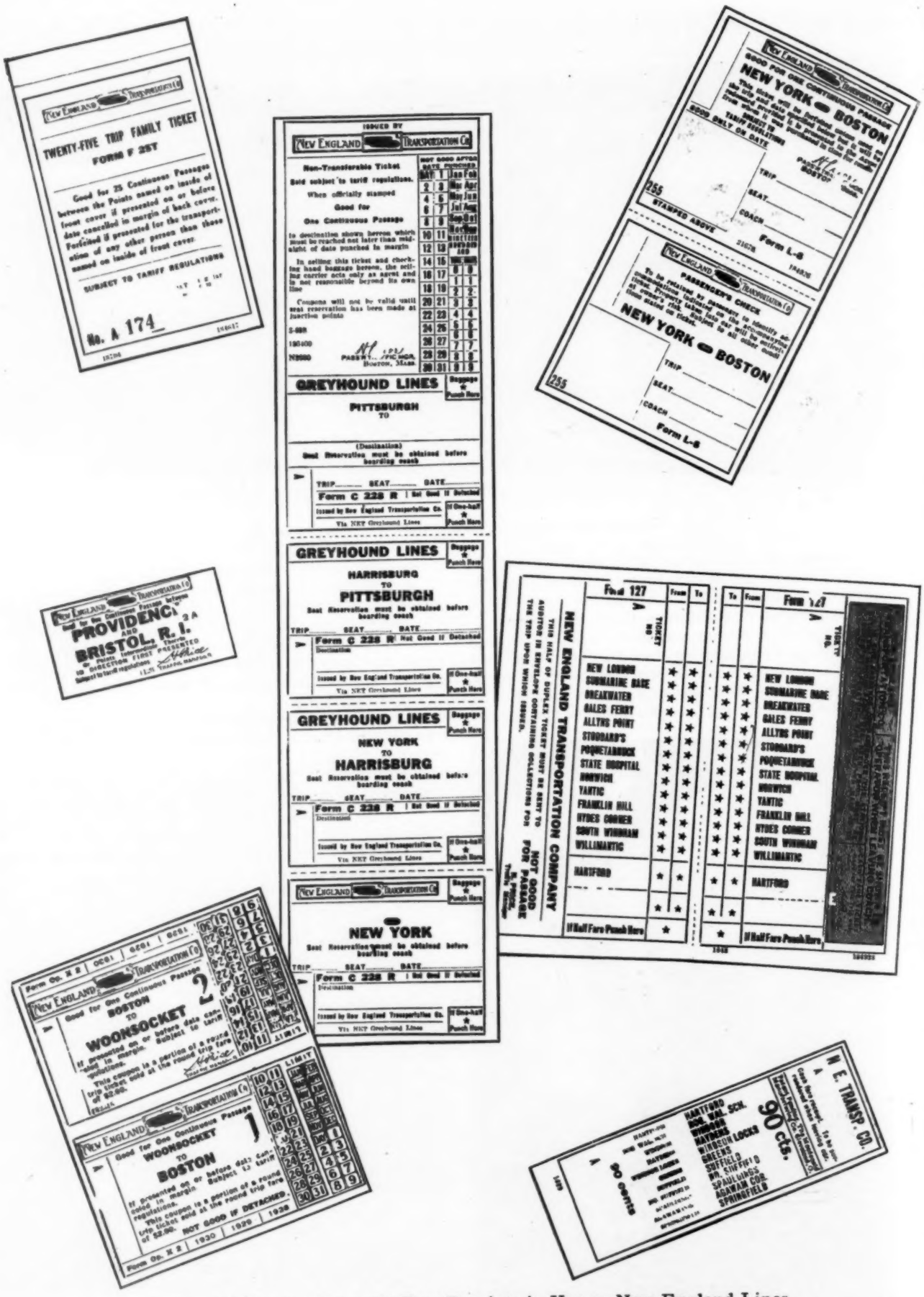
There is a large amount of motor trucking done in the interchange of freight between the New York Central lines and other roads or steamships or boat lines at junction points. This service takes the place of the handling of such freight in cars between the freight houses of the different carriers, and results in economy to the railroad and better service to the public. As an example, the interchange of freight by freight car at Buffalo requires the handling of such cars through the yards in from five to seven movements, with consequent delay and expense, while such freight can be handled by motor truck in a cross-city haul which requires but a few minutes.



Loading a Container onto a Motor Truck by Crane

The use of unit containers for shipping l.c.l. merchandise and brick, lime, stone and other coarse commodities in bulk is expanding rapidly. An appreciable increase in heavy trucking, developed from the use by the public of steel shipping containers operating on the New York Central for the past several years, has taken place, and it is expected that this service will be greatly extended. At the present time merchandise containers are handled by motor trucks and trailers in New York, Utica, Syracuse, Rochester, Buffalo, Erie and Cleveland on the New York Central, and at Springfield and Boston on the Boston & Albany. These containers, with a maximum load, have a gross weight of more than six tons each and are loaded six to the car. The trucks are loaded with either two or three containers for movement to and from the warehouses of shippers and consignees. The containers are transferred to and from the trucks and the gondola cars, especially equipped for handling such containers, by means of gantry cranes owned by the railway. The containers used for bulk commodities are of smaller size and load twelve to the car.

Without going into extensive detail, I have tried to show in a general way that altogether there is a large amount of trucking involved in the New York Central transportation service, and to indicate that our policy has been to have the trucking work performed by truck owners or operators under contracts. This trucking service operates as an adjunct to our actual freight car movement and not as a matter of competition between the New York Central in the operation of its lines and the truckmen whose service it uses. Our operations have been profitable to these truckmen and advantageous to the railroad and its patrons.



Sample Ticket Forms and Fare Receipts in Use on New England Lines

Successful Handling of Ticketing Problems

New England Transportation Company encourages advance purchase of tickets—Interline ticket sales present new difficulties

By H. Price

Passenger Traffic Manager, New England Transportation Company

FOR the purpose of considering various phases of ticketing, motor coach operations might properly be divided into four groups, as follows:

1. Short lines which replace rail trains.
2. Short lines which are operated on a frequent headway and at fares built in zones of 10 cents.
3. Inter-city and long haul routes.
4. Transcontinental service.

While some operators firmly believe in handling all travel on a cash fare basis, it is perhaps generally recognized by the larger motor coach operators engaged in inter-city traffic that it is important to supply passengers with tickets in advance, not only to facilitate the operation and eliminate objectionable delays attendant upon cash fare payments, but likewise to minimize the clerical work required of operators, to reduce the possibilities of manipulation of one kind or another, and to insure that the passenger uses a given service instead of that of a competitor.

The elasticity of motor coach operation, which admits of convenient coach stations or stops, makes for some difficulty in carrying out a complete program of ticket sales, or at least in supplying the preponderance of passengers with tickets.

A large proportion of the travel on inter-city routes avails itself of the facilities at terminal points, owing to the central location of these terminals, and further to the fact that choice seats can thus be obtained. Nevertheless, on all motor coach routes, and particularly in the larger cities, a substantial part of the traffic finds it more convenient to board the coaches at intermediate signal points. This condition has been noted in the experience of our company, which at the present time finds that 45 per cent of the total travel, producing 62 per cent of the gross passenger revenue, purchases tickets prior to boarding coaches. This leaves the large proportion of 55 per cent who pay cash fares, the average cash fare being 42 cents, indicating that the major volume of cash fares is represented by 10 or 20 cent units.

PURCHASE TICKETS
BEFORE BOARDING
MOTOR COACHES
Cash fares paid on Motor Coaches make difficult the maintenance of schedules.
Tickets are on sale at all Railroad Stations reached by Motor Coaches. Passengers are urged to purchase tickets.
NEW ENGLAND TRANSPORTATION COMPANY

Posters Urge Passengers to Purchase Tickets in Advance

PLEASE HAVE EXACT FARE READY
First Zone: Providence to E. Providence (Watchemoket Sq.) 10 cents
Second Zone: E. Providence to W. Barrington (Post Office) . . 10 cents
Third Zone: W. Barrington (Post Office) to Warren (Joyce St.) 10 cents
Fourth Zone: Warren (Joyce St.) to Bristol . . . . . 10 cents
No passengers carried from Providence to points north of Wm. Langevin Store, 3501 Pawtucket Avenue
NEW ENGLAND TRANSPORTATION COMPANY

Exact Fares are Requested in Posters of This Type

Encourage Advance Sales

Recognizing the desirability of the advance sale of tickets, every consistent effort has been made to educate our patrons to that end. This has been undertaken through the medium of card advertising, notices in timetables, announcements on coaches, etc., until at the present time the ratio as previously mentioned has been obtained, and the campaign to more fully accomplish the purpose is still in progress.

The short lines which replace railroad trains present no serious problem, as, generally speaking, there is some incentive for the passenger to purchase tickets. The actuating reason may be attractive trip ticket or commutation rates, the privilege of checking baggage, through journeys on the rail trains, etc. The major ticketing problem exists on the short lines which operate on frequent headway and which in effect are similar to trolley operations.

On most inter-city routes, studies will indicate that groups of passengers, perhaps the great majority from a given section, have for one reason or another found it convenient to board coaches at more or less centralized

points. In other cases educational campaigns may result in acquainting passengers with the fact that it would be mutually advantageous to use selected points, to the end that ticket agencies may be established through the employment of drug stores, stationery stores, news stores, hotels, etc., either on a commission basis or in some other equitable manner.

Through the medium of signs, the travelers can be acquainted with the location of these agencies, and furthermore orders can be issued so that drivers will inform cash fare passengers of these locations. This arrangement results not only in the sale of a substantial number of tickets in the aggregate, but localizes the operation, thus producing a desirable effect in connection with competitive travel.

Long haul routes and transcontinental service present no problem of this character inasmuch as passengers very quickly become acquainted with the fact that positive seat assignments are required, in a manner identical to the Pullman arrangement, it being quite generally recognized that advance information of the traffic demand is essential in connection with long haul service, and seat assignments makes this information available.

Handling Cash Fares

The handling of cash fares constitutes a considerable problem, not only from the standpoint of revenue protection, but also from that of preventing delays in schedules. The employment of methods to handle cash fares properly depends entirely upon the character of the route involved. Thus, on routes where only one or two cash fares are to be received, it is perhaps doubtful if a more economical or practicable arrangement could be found than the duplex check system.

With only one or two exceptions, our collection system is "Pay Enter". Drivers merely cancel the tickets on first presentation and return them to the passengers for subsequent presentation when the passengers leave the coach. As passengers are always presented with a receipt of some nature, duplex, tally check, or fare register slip, for cash fare payments, every passenger in the coach has in his possession something to indicate that a fare has been paid. In consequence, coach auditors can at any time board a coach and determine very promptly if the company's interest has been protected.

Our first experiment was with the conventional style of duplex check, with no penalty arrangement because of competitive conditions. Experience on our short haul routes, where numerous 10 cent fares were paid, promptly revealed the fact that the duplex check was not adapted for that particular type of operation. In consequence, cash fare boxes were substituted. In the operation of the cash fare box, the passenger is required to deposit his fare upon boarding the coach and at the same time is furnished a "tally check" which is presented upon leaving. Occasionally the reverse of this procedure is followed.

Having tried both duplex checks and fare boxes on other routes, and finding that neither readily lend themselves to these particular routes, the latter in part because of fares in excess of 25 cents, subsequent tests have been made with the MacDonald System of tally checks, which in effect is a duplex check that admits of rapid handling.

Within the recent past, a program of fare collections through the medium of fare registers, both manual and electric driven, has been undertaken on a substantial number of routes, and these appear to meet the requirements of speed, accuracy, revenue protection, and minimizing clerical work required of drivers.

As round trip fares contribute no small portion of the revenue on many competitive routes, it is of major importance to see that no obstacles are placed in the way of the availability of these tickets. Thus it is imperative that drivers be able to issue this class of ticket to those who board the coach at local stops. This we accomplish with drivers' forms of round trip tickets, upon which the date of issuance or expiring date is indicated by punching out a date block, and in some instances, because of the number of different round trip fares, by punching out the point of origin and destination as well.

The interchange of through travel between connecting motor coach lines is growing, tickets being on sale for transportation from coast to coast, resulting in an increasing demand from the public for this class of transportation. The duties of ticket selling forces are materially increased by this arrangement, until today a good motor coach ticket seller is required to possess a knowledge of routes, rates, tickets and schedules comparable with that of the employees in a very busy railroad station.

Interline Sales Present Difficulties

This interline travel, with the ramifications it entails, and despite the voluminous and very complete tariff and route charts published by the trans-continental carriers, presents new problems in connection with commission agencies, stores where the sale of tickets is merely an incident to the regular business; although the fascination of selling "yards of tickets" has quite an appeal, to say nothing of the very attractive commission which the sale of such a ticket yields.

As many passengers have heretofore merely purchased tickets from a given company only between local points, and have purchased tickets for further travel at junction points, it is obvious that on competitive routes this class of service merits attention.

In the physical issuance of tickets, the plan on the New England Transportation Company closely parallels that of our parent company, the New Haven railroad. Local tickets are identical in size to admit of the use of ticket tubes in station ticket cases; interline tickets embody the same principle and style because of their proven adaptability, and trip and commutation tickets follow the convention styles.

In the acceptance of railroad tickets, the same punch cancellations are made on the motor coaches as on the trains, so that no question can arise as to the use or non-use of tickets in connection with refunds or claims.

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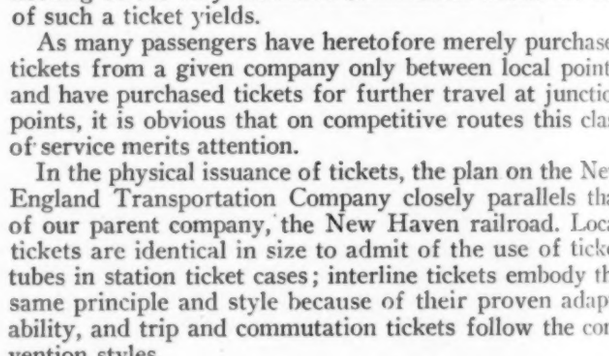

Turning a Motor Coach on the 30-ft. Turntable in the B. & O. Motor Coach Terminal, New York

Joining the Railways and Highways

What the Boston & Maine has found out about train and motor vehicle co-ordination during the last five years

By George Hannauer
President, Boston & Maine

THE SUBJECT of motor vehicle operation becomes increasingly important. It presents many problems. The proper solution of these problems demands the best thought of those engaged in the automotive industry and of those engaged in transportation industry. It demands careful study by public officers who have to do with the use of highways, and by the business interests who depend upon transportation for distributing their wares; in fact, every user of the highway is interested in the solution of these problems.

The railroads have gone into the use of the motor coach and the motor truck, but their experience covers barely five years. Within that time, about 70 railroads have adopted the motor coach, and they are operating over 2,000 of them. These are used largely in short haul service under various conditions, in some of which motor coach service and co-ordinated rail-motor coach transportation are now pretty well established. Recently long distance travel by motor coach has developed by leaps and bounds, and today there is regular service between points as much as 3,000 miles apart. Railroads have recently interested themselves financially in motor coach companies engaged in long distance motor transportation.

The railroad is the logical agency to operate motor coaches and motor trucks between communities in its territory. The railways should be experimenting extensively with motor vehicle operation, in order that proper co-ordination of these two allied forms of transportation may soon be effected, says Mr. Hannauer, in this abstract of an address which he presented in St. Louis, Mo., on October 15 at the annual convention of the Associated Traffic Clubs of America.

The railroads have been identified with the shorter motor coach operations for some years, the Boston & Maine since 1924. We have learned a lot out of this operation ourselves, and a few references to the railroad's experience in commercial passenger carriage by motor over highways may be of interest.

First, we are certain that the private automobile has been the greatest factor in taking passenger traffic from the railroads. Its inroads on the long-haul traffic have not been so severe, and they have not been so severe on the suburban traffic in large cities. But the automobile has seriously affected what might be termed the local traffic.

It has been found that we can operate the motor coach over the highways for much less than the cost of running a passenger train on the rails, and as a result we can afford to provide for the light traffic in local territory more service by motor coach and at less cost than by regular passenger trains. Railroads have developed motor equipment which handles not only passengers but also mail, newspapers, baggage and express.

The use of the motor coach in the so-called feeder lines has helped the passenger traffic of the railroad, by feeding to main line trains. In some instances it has reduced the cost of providing the service. In other cases it has enabled communities to enjoy organized transportation where such service would otherwise have been prohibitive.

Operating motor coaches between small towns, even along the railroad line where such towns are numerous, is seldom profitable. The answer seems to be that so many people use automobiles that insufficient passengers are left to support even a motor coach. The motor coach, like the railroad train, finds its best chance for profit in operating between important centers of population.

Important population centers are usually pretty far apart, and long distance travel by motor coach is less comfortable and is much slower than travel by rail. Yet many people use the highway motor coach for such trips. Some people ride it for its novelty and some may find it more convenient, but is likely that the chief reason is the lower fare. This is surely true where the rail service is frequent and good. For instance, between Boston and New York there is splendid and frequent train service. In fact, during certain parts of the day, trains go almost every hour. Yet there is a substantial motor coach travel by highway, most of it overnight, in which the New Haven found that it could and should participate.

I seriously doubt the economic soundness of such travel on the highway. Undoubtedly the traffic can be better carried on existing trains of the railroad, but the method of accomplishing this is not clear. Between Los Angeles and San Diego, the Santa Fe solved the matter by cutting its rail rates very substantially. When in California last Spring, I was told that this move largely eliminated the motor coach from the highways between those points; that it much more than doubled the passenger traffic of the railroad, and actually increased the gross earnings in spite of the rail rate reduction. However, in other cases where rate reductions were put in effect, it actually increased the rail traffic but not enough to offset the loss caused by the rate reduction.

We know that in England it had exactly that effect.

Many remedies have been suggested, among them the adoption by our railroads of a tourist coach rate at a low price following the lower class service idea of the European railroads. It is not clear that such an arrangement would pay.

There is a field for the motor coach that is economically sound, but the limits of which are still undetermined. The motor coach has important advantages in short distances between points of light traffic, and this principle would seem to determine its ultimate field.

On the Boston & Maine, our motor coach operations include local passenger service, some of it tying in with and feeding to our main line trains; special parties that travel entirely by motor coach, such as football teams and camping parties; tours for sightseeing parties; and all-expense sightseeing tours that are partly by rail and partly by motor coach. We are operating 98 motor coaches which covered 1,222 route miles this summer.

The use of the motor truck for freight transportation continues to grow and has reached considerable proportions. The economic radius has been expanded recently by the greater use of the pneumatic tire and by the building of trucks for higher speed. It has been helped further by the building of the small and medium-sized trucks with passenger car engines. The latter seems a particularly long forward step in the development of the motor truck.

40,000 Tons Monthly by Truck

I can give you some idea of what the railroads are doing in the trucking field by reciting some of the trucking activities of the Boston & Maine. The total route miles served by trucks on the Boston & Maine is 785. In this service we employ 175 pieces of equipment and handled in August 40,000 tons.

The truck has superseded the local freight train in the handling of l.c.l. freight on 764 miles of our system. The method is to group the freight for several stations in a car that is billed to the point most advantageously located for distribution to several stations. The car is run out on the night trains, and is ready for unloading at destination in the early morning. Our trucks start early and distribute the freight to the other stations, or to the store-door if the shipper will pay the extra charge assessed for store-door delivery. The same trucks assemble the l.c.l. freight for movement in the opposite direction, picking up at the various freight stations or store-door as the case may be, and concentrate the load at the strategically located stations where the freight is promptly loaded into cars, the cars being moved to destination in the night. This has expedited service appreciably.

Another form of service is that of assembling what the east calls ferry car freight, and what the west calls trap car freight, with trucks instead of doing the job with cars. The work is done under the ferry car tariff. Such service is, of course, limited to industries that have Boston & Maine sidings. In some instances we use trucks in lieu of the freight cars for hauling freight from our local stations to the steamships.

L.c.l. Traffic Increasing

Store-door delivery in local territory by truck is being extended gradually and now reaches about 45 stations. In every case where the truck is used in lieu of the rail, we use the truck because it costs less than it would cost to give the required service with rail equipment. The use of the truck has enabled us to so improve our service that l.c.l. traffic, which has been declining for some years, has increased appreciably in the last year.

The railroad is the logical agency to operate highway motor vehicles between communities in its territory. It can use the highway or the rail, whichever best fits the job, service and cost considered. It can co-ordinate the two so that passengers, mail and express will receive through rail-highway transportation, with undivided responsibility. The railroad brings regularity and permanence to the service. The railroad will operate over a large area and thus provide maximum co-operation in the highway service. The railroad will provide responsibility for safe carriage and responsibility to its patrons and to the general public where there is now much irresponsibility. Finally railroad operation of highway motor vehicles for hire will facilitate a desirable public regulation.

While conditions on various railroads differ, I am nevertheless convinced that the railroads should be experimenting extensively with passenger and freight motor vehicles on the highway as a part of their service, in order that rail and highway transportation may each find its proper sphere. It would seem also that public bodies should co-operate freely with such operations, for if these experiments are not made, we are likely to fail for a long time to put motor operations on an economically sound basis.

In determining these questions, we must consider safety, convenience, comfort and cost, including in the latter the cost of highways to the public. The principal user of the highway being the passenger automobile, we must determine if it is economically sound to build highways stronger and wider at great expense in order that commercial vehicles may not delay and endanger the passenger automobile, or whether it is better to reduce the size and weight and accelerate the speed of the commercial vehicle so that it will approximate the dimensions, the weights and the speed of the larger private automobiles. I believe the latter will be found the correct solution, at least for transportation between communities.

The gross business of our motor transport department is running at the rate of $1,750,000 per annum, a substantial transportation business in itself. Practical traffic men, railroad officials, and students of transportation alike, are agreed that the railroad is, and will remain, the principal transportation medium of the country for inland movement. Our task is to coordinate effectively the functions of rail and highway transportation, and especially to do our part in guiding the development of highway vehicles along sound lines.

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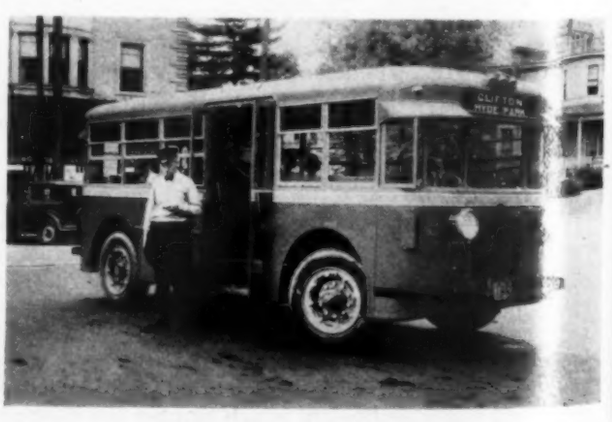


New 21-Passenger Twin Coach

The Best Ways

to Clean Motor Coaches

REALIZING that clean, attractive equipment helps to increase traffic and has a beneficial effect upon the morale of the employees, the committee on garage design of the American Electric Railway Engineering Association engaged in a study of motor coach cleaning methods, upon which it reported at the recent annual convention of the association in Atlantic City, N. J. By means of questionnaires distributed among more than 30 motor coach operating companies, the committee secured a comprehensive picture of the methods used by representative operators.

The questions included in the questionnaire, together with the answers received and the committee's own comments, are abstracted below.

Washing Motor Coach Bodies

What type of washing system do you use for cleaning the exterior of motor coaches?

Answers—12: spray systems; 13: brush, soap and water; 4: high pressure.

Committee comment: The spray rack is desirable when it is the policy of the company to attempt to provide continually clean motor coaches and where garage space permits. This is true particularly of the larger companies where all motor coaches are washed daily and where the time allowable per motor coach for exterior washing is limited. In smaller systems and where garage space does not permit, the spray gun system is probably more desirable. While the spray rack uses considerably more water than the spray gun, the saving in man hours is of more value than the cost of water.

Do you augment your water pressure for this washing by high pressure pumps or any other method?

Answers—20: city pressure; 10: augment pressure by various patented systems.

Committee comment: When the city pressure is less than 50 lb, it should be augmented.

Do you use hot or cold water?

Answers—22: cold; 8: warm; 1: cold in summer and hot in winter for benefit of washers.

Committee comment: Where the spray rack system is used, hot water is not practicable, although in extreme cases it may be necessary to brush down the coaches with hot water and soap.

Do you use soap or a washing compound?

Answers—16: soap; 15: washing compound, either Oakite, trisodium phosphate or Pittsburgh Cleanser.

Do you use a "dry wash" of some type?

Answers—13: daily; 7: every two days; 8: every third day or more; 1: weekly; 1: every 500 miles.

Committee comment: The resume of the above is probably

sufficient answer to the question. This is optional and depends on the policy of each company, although it is the opinion of the committee that daily washing will keep the vehicles in such condition as to attract more rides.

Are the windows washed oftener than the exterior of the coaches?

Answers—11: yes; 14: no.

Committee comment: When motor coaches are washed every day, the windows should be cleaned both inside and outside, and in cases where motor coaches are washed every third day or more, the windows should be washed more often than the vehicles, preferably daily.

Do you have a fixed wash rack or do you wash the coaches wherever they may be located in the garage?

Answers—25: fixed rack; 2: wherever located.

Committee comment: A fixed rack should be used wherever possible.

Cleaning Chassis Frames, Engines, Etc.

Do you believe it is worth while to clean chassis frames, axles, drive shafts, transmissions, crankcases, and the under side of fenders?

Answers—16: yes; 5: underside of fenders at each washing; 3: no; 1: advocated but not practised because of lack of proper equipment; 2: as a matter of fire protection; 2: only at time of repair or overhaul; 1: all parts exposed to view.

Committee comment: Most certainly all parts exposed to view should be kept clean. Other parts not exposed to view need not be cleaned except when repairs are being made.

If so, how often do you clean these various parts?

Answers—2: 2,000 miles; 1: 4,000 miles; 2: 5,000 miles; 1: 10,000 miles; 1: 20,000 miles; 3: daily; 4: monthly; 2: every two months; 4: overhaul period only; 3: no definite interval.

Committee comment: Parts not exposed to view should be cleaned at every major inspection period in order to insure satisfactory work and minimum labor costs. It is evident that this covers overhaul periods as well.

Do you have any special equipment such as high pressure sprays for such cleaning?

Answers—3: steam; 9: high pressure; 5: yes; 6: no; 1: gas spray gun; 1: kerosene spray gun.

Committee comment: Steam and hot water systems are the more desirable for such cleaning.

How often do you clean the engine and other accessories under the hood?

Answers—1: 200 miles; 1: 500 miles; 2: 2,000 miles; 2: 3,000 miles; 3: 5,000 miles; 1: 6,000 miles; 1: 10,000 miles; 1: 15,000 miles; 1: 24,000 miles; 1: 40,000 miles; 1: 50,000 miles; 1: weekly; 1: twice per month; 3: monthly; 1: every three months; 1: every six months; 2: at overhauls.

Committee comment: Engines and other accessories under the hood should be cleaned at the time of major inspection.

What liquid do you use for cleaning engines, etc.?

Answers—3: steam; 14: kerosene; 3: gasoline; 4: Oakite; 1: steam jet; 1: fuel oil; balance hot water. Note: majority under pressure.

Committee comment: This is optional. The Committee urgently recommends that the regulations of the National Fire Protection Association be followed.

Is the cleaning fluid heated?

Answers—19: no; 6: yes.

Committee comment: This is optional and depends on the type of cleaning compound used.

Cleaning Interior of Motor Coaches

Daily cleaning, dusting, etc.?

Answers—16: daily; 1: floors and seats only.

Committee comment: Recommends that the interiors of all coaches be swept and dusted daily.

Do you use mechanical equipment on your property for cleaning, dusting, etc., or do you do it entirely by hand?

Answers—28: by hand; 8 of these companies use vacuum to augment hand cleaning.

Committee comment: It is a matter of economy and efficiency dependent on the local conditions, cost of labor, etc., as to whether vacuum cleaners are desirable, except in case of plush seats, where vacuum cleaners are recommended.

What type of mechanical cleaner, if any?

Answers—8 different makes of large capacity vacuum cleaners.

Committee comment: Any type of standard vacuum cleaner may be used, so long as it is not too bulky and will do a thorough job. The limiting factors are the size of tools and length of hose necessary.

Periodical cleaning, such as washing, floors, ceilings, etc.?

Answers—All but four of the companies replying mop floors and wash ceilings periodically. Three gave no answer and one answered, "No".

At approximately what period?

Answers—2: daily; 6: weekly; 6: monthly; 1: three months; 1: four months; 1: six months; 3: 2,000 miles; 1: 3,000 miles; 1: 5,000 miles.

Committee comment: Interior of coaches should be cleaned at sufficiently frequent intervals to keep the coaches attractive at all times. The period depends partially on the conditions of operation, and partially on the type of service rendered.

Do you use mechanical equipment on your property for washing the interiors of coaches or do you do it entirely by hand?

Answers—27: by hand; 1: augments with vacuum.

Committee comment: There seems to be no satisfactory method for the use of any type of machine for the mechanical washing of the interiors of coaches.

What type of mechanical cleaner, if any?

Answers—29: blank; 1: vacuum.

Cleaning of Parts

What method do you use for cleaning chassis parts during mechanical work or overhaul?

Answers—1: gasoline with spray gun and brush; 1: kerosene with air spray gun; 6: by hand with brush and kerosene or gasoline; 1: gasoline dip tank; 2: kerosene dip tank; 3: steam spray; 3: steam spray with chemical and air spray with kerosene; 7: cleaning tanks; 4: cleaning tanks and spray; 1: cleaning tanks and steam spray gun.

Committee comment: On large properties with 100 or more coaches, a dipping tank is a more satisfactory method for cleaning parts. On smaller properties the method is optional, depending on the number of coaches and other conditions. Where such parts are cleaned by spray, the National Fire Protection Association regulations should be followed.

Is any mechanical device used?

Answers—1: high pressure water system; 13: no; 1: power driven wire brush; 1: steam spray and air gun; 5: air spray gun; 6: steam spray.

Do you use a chemical cleaner for such work?

Answers—18: yes; 11: no.

If so, what?

Answers—3: gasoline; 8: kerosene; 1: tri-sodium phosphate, kerosene or carbon tetrachloride; 1 : soap or Pittsburgh Cleaner with kerosene; 4: Oakite and kerosene; 6: Oakite; 1: Oakite and gasoline; 1: washing soda and kerosene; 1: Oakite, caustic soda or gasoline; 1: Magnuson X. C. E. M. No. 70; 1: caustic solution; 1: standard brand.

Committee Comment: The type of cleaning fluid used is optional but in cleaning electrical parts, carbon tetrachloride is more desirable, as other types of compounds may cause oxidation of the copper. In the use of carbon tetrachloride it should be used sparingly, inasmuch as large quantities may cause dissolution of the rubber.

Polishing of Motor Coaches

Do you do any so called "dry washing" or polishing of coaches?

Answers—18: no; 7: yes; 2: nickel work only; 3: occasionally.

Committee comment: Painted surfaces of the lacquer or oxidized oil type of paint should be polished at least four times per year, and nickel work should be polished frequently enough to keep it always in first class condition.

What materials or cleaners do you use?

Answers—Various metal and wax polishes; 1: lemon oil.

How often is this polishing done?

Answers—3: monthly; 1: semi-monthly; 5: occasionally; 1: weekly; 1: 2,000 miles; 1: nickel at washing.

Committee comment: At least four times a year or oftener, depending on the locality and season of year.

Does the use of polishes have a detrimental effect on paint?

Answers—7; no; 6—yes.

Committee comment: Oil polishes made with lead, oil and turpentine, may be used on enamel and varnished surfaces without injurious effects. If the surface is not thoroughly cleaned to remove all abrasive substances, or if a polish composed partially of abrasives is used, the effect will be detrimental. Lacquered or oxidized oil paint may become dull and can be restored by the use of polish with slight abrasive content without detriment to the surface. However, excessive polishing will wear away the surface. Polishing with considerable abrasive content should be handled only by skilled men, preferably painters.

Motor Coach Fleet Maintenance *

By Carroll C. Humber
Transportation Superintendent, Longview Public Service Co., Longview, Wash.

DETAILED monthly cost sheets and reactions reported by the riding public indicate whether maintenance requirements are being neglected. Without adequate care for motor vehicle equipment, the cost of operation will rise, and patrons having an average degree of civic pride will not ride in motor coaches which are not safe, comfortable, clean, quiet and pleasing to the eye. Cost accounts must be subdivided so that any item contributing to a rise in cost of operation can be detected at once. To be entirely helpful, itemized costs must be kept for each unit of the fleet; these cost data must be available for the month, the year to date, the last full year and, if possible, for the last several years. The figures should be embodied in a statement so that comparison can be made between similar items for each unit operated. Units differing in make or type should be grouped and averages shown for each group.

Records Must Identify Items

To keep costs below a predetermined level and reduce them, records must make possible the quick identification of each item that contributes to any rise in cost, and constant effort should be made to reduce the costs of each item to a figure which is not excessive.

Our methods have resulted from cut-and-try procedure when the industry was rather undeveloped and the experience of others in the field was not available. We operate a fleet of 13 motorcoaches in the cities of Longview and Kelso, Wash., over five major routes totaling 16¼ miles one way. Fifteen per cent of the roadway is surfaced with gravel, and 85 per cent is paved with concrete. The vehicles operate an average of 19 hr. daily, the total annual mileage is 500,000 miles, and more than 1,000,000 passengers per year are transported.

The service was begun in July, 1922, with two motorcoaches. Within six months, six motorcoaches were operating over gravel-surfaced roadways which became next to impassable each time it rained. It was continuously necessary to replace broken springs, axles, frames, wheel bearings, worn brake-drums and linings, worn steering and drive-line bearings, and bushings. By the summer of 1923 the fleet had increased to comprise more than 150 units, including tractors, cranes, shovels and other types of automotive machinery.

Complete Inspection System Adopted

During the spring of 1924 we adopted a complete system of inspection and maintenance, on a mileage basis. Inspection sheets were compiled for each make and type of motor vehicle equipment. Mileage periods were established for all units operating where reasonable mileage was to be expected and, for the miscellaneous equipment, a time period was used. Inspection sheets were turned over to the shop force with only such items checked as were to be inspected.

This was handled in such a way that the shop force was not burdened with remembering anything; each item to be inspected *was* inspected, and also adjusted. Any part not likely to continue in safe operation until the next periodic inspection was replaced. Every item checked out, if inspected, was checked back by the mechanic who did the work. He delivered the sheet to the shop foreman, who made such notation as he thought was necessary, and it was then sent to the office, where it was filed under unit headings for a permanent record. No records were kept by the shop foreman.

With this system, our costs immediately dropped two cents per mile. The equipment was always ready for immediate service, or we knew that it was not ready, and the uncertainty of not knowing when a unit was likely to fail was eliminated. We use practically the same system at present, although changes were made from time to time on account of changed conditions or to effect greater economy.

Two first-class mechanics and one helper are em-

* From a paper presented before the Northwest section of the Society of Automotive Engineers.

Table 1—The Longview Public Service Company Operation & Maintenance Mileage Costs for August, 1929

Cost, Cents per Mile, for Motor Coach No.—	1	2	4	6	7	8	9	10	11	12	14	15	16	Total August	Total 8 Mos.
OPERATION															
Drivers	.0526	.0526	.0526	.0526	.0526	.0526	.0526	.0526	.0526	.0526	.0526	.0526	.0526	.0526	.0526
Gasoline	.0220	.0267	.0210	.0216	.0387	.0242	.0431	.0280	.0230	.0217	.0216	.0233	.0307	.0255	.0224
Lubrication	.0030	.0041	.0044	.0033	.0033	.0016	.0030	.0030	.0042	.0036	.0041	.0042	.0055	.0036	.0027
Cleaning	.0044	.0044	.0044	.0044	.0044	.0044	.0044	.0044	.0044	.0044	.0044	.0044	.0044	.0044	.0031
Greasing	.0045	.0045	.0045	.0045	.0045	.0045	.0045	.0045	.0045	.0045	.0045	.0045	.0045	.0045	.0037
Tires	.0115	.0115	.0115	.0115	.0115	.0115	.0115	.0115	.0115	.0115	.0115	.0115	.0115	.0115	.0115
August Cost per mile	.0980	.1039	.0984	.0979	.1150	.0988	.1191	.1040	.1002	.0983	.0987	.1005	.0992	.1021	
8 Mos. Cost per mile:															.0960
MAINTENANCE															
Engines	.0042	.0157	.0044	.0020	.0105	.0049	.0000	.0158	.0064	.0008	.0000	.0029	.0056	.0050	.0046
Chassis	.0143	.0128	.0039	.0235	.0076	.0012	.2652	.0144	.0295	.0016	.0017	.0010	.0045	.0074	.0049
Brakes	.0000	.0016	.0003	.0009	.0015	.0011	.0000	.0041	.0122	.0004	.0003	.0014	.0004	.0015	.0023
Electrical	.0077	.0058	.0029	.0356	.0011	.0014	.0456	.0078	.0019	.0011	.0009	.0077	.0082	.0041	.0023
Body	.0046	.0128	.0043	.0036	.0004	.0022	.1645	.0124	.0049	.0033	.0038	.0037	.0031	.0031	.0037
Paint	.0000	.0000	.0000	.0000	.0000	.0000	.0000	.0000	.0000	.0000	.0000	.0000	.0009	.0000	.0013
August Cost per mile	.0308	.0487	.0158	.0656	.0211	.0108	.4753	.0545	.0549	.0072	.0067	.0167	.0227	.0211	
8 Mos. Cost per mile															.0191
Total Cost per mile	.1288	.1526	.1142	.1635	.1361	.1096	.5944	.1585	.1551	.1055	.1054	.1172	.1219	.1232	.1151
Mileage	4,679	1,982	2,789	908	6,275	3,835	51	208	2,430	5,991	4,224	4,085	1,803	39,266	
Gas Mileage Per Gallon	9.2	7.4	9.8	9.3	5.2	8.3	4.6	7.4	8.4	9.2	9.3	8.5	6.5	7.9	
Oil Mileage Per Quart	91	64	55	69	79	182	51	69	52	57	55	56	36	69	

ployed in our shop during the day and one greaser at night. We do all of our mechanical work except overhauling electrical units and grinding shafts and pistons, which work is sent to shops that specialize in it.

Preventive Maintenance a Feature

Experience has indicated that this inspection system is a great preventive of unforeseen delays to equipment. The time required is approximately 128 hr. per 100,000 miles, and the wage cost is approximately $96 for that mileage. At first, inspections consumed considerable time and disclosed conditions which necessitated many major repairs on account of the severe nature of the service; but the men soon became accustomed to the system and were able to make casual inspections with much exactness.

Every fleet operation with which I am familiar differs from others, and no standard system of inspection and maintenance would apply to all alike. Development of a suitable system is a problem that each fleet superintendent must solve if strict economy and efficiency of operation are to be attained. In such an analysis due consideration must be given to the type of the equipment, the nature of the service performed, the average loads, the speed to be maintained, and the nature of the roadways over which the vehicles travel.

Inspection System Adapted to Vehicles

Our inspection system is designed to care for our particular condition as to the character of the service and the type of equipment used. Vehicles that operate over gravel-surfaced roads require much more frequent attention than those running on pavement. Our inspection periods differ for each type; one type of road is mostly smooth and free from dirt, and the surface of the other, wet or dry, is being constantly thrown up

Motor Coach Inspection Sheet

Coach No. ..... Date 192

The intention of this inspection is to assure the safe operation of this unit for another 3000 to 5000 miles. Any parts or material that will not, with entire safety, stand up for that period of time must be replaced.

I am satisfied that a thorough examination of the above numbered coach has been made, that all defects have been remedied and that the coach is in good running condition.

Signed .....
Foreman.

	Work Done by	Condition of Each Unit after Inspection
No. 1—RADIATOR AND HOOD		
(a) Examine radiator for leaks		
(b) Examine radiator core and shell fastenings		
(c) Examine radiator hold-down bolts		
(d) Examine hood hold-down clamps		
(e) Examine radiator to dash rod		
No. 2—ENGINE		
(a) Run engine and examine for knocks		
(b) Examine pump, water inlet and outlet, and hoses		
(c) Examine for oil leaks		
(d) Drain crankcase and clean strainer		
(e) Test compression		
(f) Examine fan-belt and grease fan shaft		
(g) Examine engine hold-down bolts and supports		
(h) Examine main bearings		
(i) Examine connecting-rod bearings		
(j) Examine valves; grind valves		
(k) Remove pistons and install new piston-rings		
(l) Refill crankcase		
No. 3—IGNITION		
(a) Clean and inspect magneto		
(b) Clean and adjust breaker points		
(c) Oil bearings		
(d) Test all wires and tubes		
(e) Clean and adjust spark-plugs		
(f) Examine ground switch and wire		
No. 4—CARBURETER		
(a) Remove jet caps and clean wells		
(b) Examine float, weights, and clean screen		
(c) See that manifold connection is O.K.		
(d) Examine fuel line and clean sediment bulb		
(e) See that tanks are secure and that the line is not rubbing		
(f) Examine throttle cross-shaft and pins		
No. 5—CLUTCH		
(a) Examine clutch and throw-out bearings		
(b) Test for slippage and clearance		
(c) Wash out and refill		
No. 6—TRANSMISSION		
(a) Test for noise		
(b) Drain and examine gears		
(c) Examine bearings for lift and thrust		
(d) Refill to correct level		
(e) See that shifting bars are properly dogged		
(f) Examine hand-brake ratchet and dog		
No. 7—PROPELLER-SHAFT		
(a) Inspect shaft and universals		
(b) Inspect driveshaft center-bearings		
No. 8—REAR AXLE AND BRAKES		
(a) Jack up rear end and see if both wheels are free		
(b) Test for lift and lateral motion in bearings		
(c) See that wheels are tight on taper or shaft		
(d) See that brake-drum bolts are tight		
(e) See that felloe bands are O.K.		
(f) Examine rear-spring clips		
(g) Examine rear springs		
(h) Drain differential and inspect bearings		
(i) Inspect gears and pinion		
(j) Inspect rear-wheel bearings and locks		
(k) Grease rear-wheel bearings		
(l) Refill differential		
(m) Inspect and adjust service brakes		
(n) Inspect and adjust hand brake		
No. 9—FRONT AXLE, STEERING AND FRONT SPRINGS		
(a) Jack up front end and test bearings for wear		
(b) Check wheels for toe-in and camber		
(c) Grease front-wheel bearings		
(d) Examine tie-rods and drag-link		
(e) Inspect spindle bolts and bushings		
(f) Inspect front springs and spring clips		
(g) Inspect steering-gear		
(h) See that bracket is tight		
(i) See that all nuts are pinned		
(j) See that the steering-column is secure and tight		
(k) Grease steering-gear and all pins		
(l) Inspect speedometer head, chain, swivel and gears		
(m) Grease speedometer swivel and chain		
No. 10—ELECTRICAL		
(a) Remove and inspect generator		
(b) Check output and oil bearings		
(c) Remove and inspect starter motor		
(d) Oil starter motor		
(e) Inspect all lights and see that they are clean		
(f) Inspect signal system		
(g) See that all connections are tight at the switch		
No. 11—TIRES		
(a) Dismount and inspect all tires that have not been dismounted within two weeks		
(b) Inflate all tires to correct air-pressure		
No. 12—BODY		
(a) Examine windshield cleaner		
(b) Inspect for loose seats and windows		
(c) Examine body hold-down bolts		
(d) See that fenders and bumpers are tight		
(e) Test fire extinguisher		
(f) Test heating system		
(g) See that cushions are in good condition		
(h) Test driver's door-control		

Nos. 1 to 4 inspections are made each 5000 miles; time required, 1 hr. 30 min. No. 5 is made each 2000 miles; time required, 30 min. No. 6 is made each 20,000 miles; time required, 1 hr. No. 7 is made each 5000 miles; time required, 30 min. No. 8 is made each 20,000 miles; time required, 4 hr. 30 min. No. 9 is made each 5000 miles; time required, 1 hr. No. 10 is made each 10,000 miles; time required, 1 hr. 30 min. No. 11 is made each two weeks. No. 12 is made each 25,000 miles; time required, 30 min.

against all under-floor points and causes rapid wear. A sample inspection-sheet is shown as Fig. 1.

Clutches are inspected after each 1000 miles in the case of graveled-road operation and each 2000 miles if the operation is on pavement. If wet, the clutch is drained and examined for clearance, the condition of bearings and faces, and the amount of pedal travel; it is also tested for slippage.

Differential cases are drained and inspected after each 20,000 miles, and a full inspection is made of the rear-axle assembly. Virtually the same process is gone through with during the inspection of all units; they are inspected for physical condition, adjustments are made and they are lubricated. Any part which we do not believe will continue to operate with entire safety until the next inspection is replaced, keeping in mind the necessity for as great a length of life as is consistent with good service and economy. This period, which originally was after each 1000 miles, gradually has been extended to 20,000 miles and this year will be made 25,000 miles unless something unforeseen happens. The same procedure is followed in the inspection of the transmission, which was a 1000-mile item at first but is now inspected each 25,000 miles; and this mileage interval will be increased to 30,000 miles this year.

Care of Engine

The engine, including the fuel system, cooling system, ignition and starter, is casually examined after each 5000 miles without dismantling to determine whether every part is tight and normal. No actual work is done or replacement made until the efficiency of the engine is known to be decreasing. If the engine is not noisy and the gasoline and oil-consumption mileages are up to a predetermined average, we leave it alone. If the piston-rings become sloppy and the valves leak, the gasoline and oil-consumption mileage-averages will decrease. If carbon accumulates to the extent that it causes the engine to knock, it is due only to oil pumping or a rich mixture, both being indicated if the

Table 2—Average Cost for Three Years Compared with Cost for 1928 and Eight Months of 1929

	Cents Per Mile		
	3 Yr. Avg.	1928	8 Mos. 1929
OPERATION			
Drivers	.0536	.0520	.0526
Gasoline	.0233	.0232	.0224
Lubrication	.0030	.0030	.0027
Cleaning	.0031	.0037	.0031
Greasing	.0030	.0038	.0037
Tires	.0121	.0103	.0115
Total	.0981	.0960	.0960
MAINTENANCE			
Engines	.0041	.0037	.0046
Chassis	.0047	.0050	.0049
Brakes	.0023	.0023	.0023
Electrical	.0020	.0013	.0023
Bodies	.0029	.0053	.0037
Paint	.0008	.0015	.0013
Total	.0168	.0191	.0191
Grand Total	.1149	.1151	.1151
Gasoline Mileage per gallon	8.2	8.6	7.9
Oil Mileage per quart	65	63	69

records are kept correctly. We have no set time for the replacement of piston-rings. We have found it necessary to replace some after less than 10,000 miles; some have gone in excess of 60,000 miles, with a loss of less than 5 per cent in the fuel and oil performances. Our average for several years is about 25,000 miles.

Formerly, valves were ground after each 2000 miles and, at a later time, at 3000 and 5000 miles; now, they are ground only if the record indicates that they need it or when the engine is opened up after about each 15,000 miles for carbon removal.

We keep very strict records of gasoline and oil-consumption mileages, and these are summarized the first of each month. If the average decreases as much as 4 per cent during any month, we find out why and remedy the condition. We also refer to the gas and oil-consumption records daily, at which time the consumption for the previous 24 hr. is posted.

Causes of Inefficient Performance

We do not always discover the cause of inefficient gasoline and oil performance in the engine cylinders, but it is almost always indicated gradually by the performance. Sometimes the ignition system, and many

Table 3—Road Delays and Accidents

ROAD DELAYS

	August	8 Months	12 Months 1928
Engines	1	12	17
Chassis	0	12	19
Brakes	0	0	..
Electrical	0	5	6
Fuel	1	11	25
Tires	2	22	2
Accidents	0	0	0
Traffic	0	8	18
Weather	0	3	0
Drivers late	1	16	16
Total	5	88	103
Average Miles Per Delay	7,853	3,723	4,807
Average Miles Per Delay, Mechanical Only	19,633	81,924	7,176

Accidents for 1928

38 accidents from all causes, of which 21 were due to drivers' carelessness or bad judgment, costing $122.50; other 17 accidents not due to any condition over which the driver had control, and cost a total of $106.10.

During 1928, brakes were covered in chassis delays; therefore number of delays due to that cause not shown.

ACCIDENTS

	August		8 Months	
	No.	Cost	No.	Cost
Driver's Error	5	$36.00	18	$125.57
Not Driver's Error	2	.....	17	106.20
Total	7	$36.00	35	$231.77
Miles Per Accident	5,609		9,362	

times the carbureter, is at fault. Faulty condensers, pitted breaker-points, defective insulation on high-tension wires, weak magnets, faulty armatures, worn jets and control valves all contribute to high fuel-consumption averages.

We have had only two cases of excessively high fuel-consumption during the last four years. In one instance the engine of a 25-passenger coach, the average fuel-consumption of which was 9.2 miles per gal. for the previous 12 months, was reconditioned; it then averaged 13.4 miles per gal. for 1652 miles, when the head of No. 1 exhaust valve broke. The valve was replaced, but after another 1500 miles No. 4 exhaust valve broke. The carbureter was replaced with one taken from a similar coach and the fuel consumption for the next 6000 miles averaged 9.1 miles per gal. It was found that the main jet of the carbureter removed should have been a No. 22 jet but actually was a No. 24 jet. A No. 22 jet was installed and the carbureter replaced on the coach to which it belonged, after which the fuel consumption averaged 9.1 to 9.3 miles per gal. The men who had driven this coach after it was reconditioned had not noticed that anything was wrong with it, and two of them could be termed expert drivers.

The cause of low oil-consumption mileage is nearly always found in the cylinders. It is not necessarily caused by a condition of the piston-rings or by wall taper but by the pistons. For example, the engine of a 25-passenger coach was reconditioned; the cylinders were rebored and honed, and then fitted with aluminum-alloy pistons of a late design that were ground to the manufacturer's specified clearances. Plain snap-rings

were used, and an oil-control ring was installed beneath them. The oil consumption of this engine for the preceding year had been 102 miles per qt., but it immediately became 56 miles per qt. and remained almost at that average for 8000 miles. Then the pistons were replaced with new ones of the same type that had been in the engine for 135,000 miles, although the old rings which had been removed were used. The oil-consumption mileage immediately increased and the average became higher than for the preceding year.

Exceptionally heavy work in 1922 and 1923 necessitated a great amount of low-gear and second-gear operation that caused considerable main-bearing and connecting-rod-bearing trouble. The bearings did not burn out but became loose. Use of different brands and grades of oil did not correct this trouble, and aluminum-alloy pistons were installed in the engines of two 5-ton gravel-carrying trucks. That ended the bearing trouble and, before the end of 1923, we changed almost entirely to aluminum-alloy pistons. The period between reboring cylinder-blocks was extended from approximately 50,000 miles to be more than 150,000 miles in motorcoach service, and the life of pistons has in some cases exceeded that mileage.

In this same type of equipment we have crankshafts which have operated more than 225,000 miles without having had the main bearings adjusted except at the time of engine overhaul. The crankpins have not been ground and the connecting-rod bearings have been taken up only at the time of piston-ring installation. These four-cylinder 56-hp. engines are installed in 25-passenger coaches that weigh 9860 lb. and on which the oil-consumption mileage has exceeded 100 miles per qt. during their entire life of more than 240,000 miles. They are not equipped with either air-cleaners or oil-filters. The oil is changed after each 666 miles. The average life of piston-rings has been more than 40,000 miles, and the gasoline and oil-consumption performances have not decreased more than 4 per cent at any time, except in the case mentioned.

Engine and Other Reconditioning

Our method of reconditioning an engine is to rebore and hone the cylinders and install aluminum-alloy pistons having a diametrical clearance of 0.001 in. for each inch of piston diameter. A quick-seating type of piston-ring is used, and the circumferential clearance is 0.002 in. An oil-control ring is installed on the bottom, and it is bled with eight 3/32-in. holes in the lower edge of the groove. The crankshaft, pistons and piston-rings are assembled in the block and run-in for 8 hr. The assembly is then dismantled and the parts washed; next the engine is assembled and run-in under its own power for 24 hr. It is then ready for service without any limitations except that, for the first two days, crankcase oil is added to the fuel in an amount equaling 2 per cent by volume. During a total of more than 2,000,000 miles of motorcoach service we have never had an engine seize after reconditioning, and this procedure has been followed consistently.

We have difficulty in determining correctly when to replace the moving parts of a chassis, such as ring-gears. I have never seen a ring-gear worn to the extent of needing replacement, although loss of its case-hardened face necessitates a change. There is no set rule for determining when to discard a worn axle-shaft or a worn gear. We attempt to extend the life of parts as long as possible, keeping in mind that we should not use parts which are worn so much that they make undue noise or contribute to difficulty in handling the vehicle. Usually we do not replace a part except when justified by considerations of greater safety, better control or increased economy of operation; but economy is never subordinated to safety. We attempt to keep steering connections and brakes up to a high standard of effectiveness because our operation is all in traffic and control of the vehicle is essential. During 2,000,000 miles of operation, no vehicle has been out of control on account of any steering or brake troubles.

Adequate Lubrication Essential

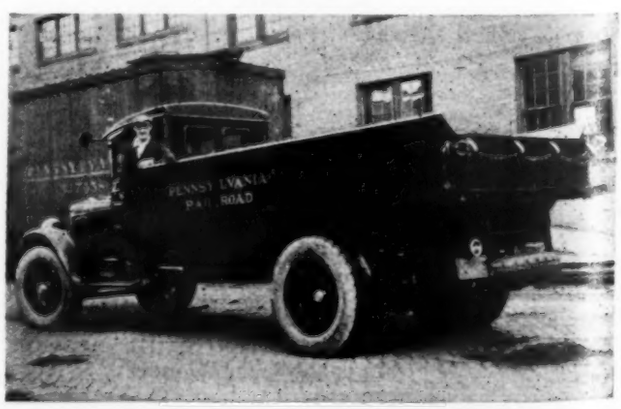
The regularity and adequacy of lubrication largely determine the length of life of a vehicle. The correct periods for lubrication must be determined, and the schedule must be followed religiously. Grease and oil are the cheapest preventive-maintenance materials that can be applied to a chassis. The normal life of any given unit can be extended greatly by adequate adjustments and the tightening of nuts, and by sufficient lubrication.

The wearing out of a vehicle does not bother us so much as does its obsolescence. We are now completely rebuilding a coach body which has been in service for five years and has operated more than 240,000 miles. The chassis has better than 50 per cent of its original value from the viewpoint of continuing in the same service. We are spending $1,000 on the body and, when finished, we believe the coach will operate for another 200,000 miles with the same efficiency as in the past; but the body is now out of style.

Good Maintenance Reduces Costs

As a result of using the foregoing methods, our total costs, covering operation and maintenance and fixed costs, have been reduced from 26 cents per mile in 1923 to 16 cents per mile in 1928. Over a three-year period, 1926 to 1928 inclusive, the operating cost for gasoline, oils, greases and the labor of cleaning and greasing, was 3.24 cents per mile or 18.6 per cent of the total cost. The maintenance cost for all materials and mechanical labor was 1.67 cents per mile or 9.7 per cent of the total cost. The total operating and maintenance cost was 28.3 per cent of the total cost. The entire cost for the year 1926 was 1.91 cents per mile; for 1927, 1.64 cents per mile; and for 1928, 1.62 cents per mile, or an average of 1.72 cents per mile for a three-year period. These figures cover all costs. The gasoline and oil-consumption averages for the same period were 8.2 miles per gal. of fuel and 65 miles per qt. of oil. Table 1 shows itemized costs for August, 1929, and the average of these items. Table 2 compares costs for 1928 with average costs for three years. Table 3 shows delay and accident data.

* * *



One of the 3-ton Trucks Assigned to the Maintenance of Way Department of the Pennsylvania

Cold Weather Operation

Important factors to be considered to avoid delayed schedules and expensive repairs

KEEPING the motor vehicle in operation in cold weather should cause the operation and maintenance departments but little worry as long as a few important factors are considered and preparations made *in advance* to take care of all operating conditions. A little time and expense given to preparation now will save a great amount of time and expense later on.

The design and construction of the modern heavy duty motor vehicle has gone through such a period of marked development that operating difficulties under any normal condition of temperature have been reduced to a minimum. However, the present day demand for continuous, on-the-minute service requires that consideration be given to every operating factor that may be a potential cause of interrupted schedules.

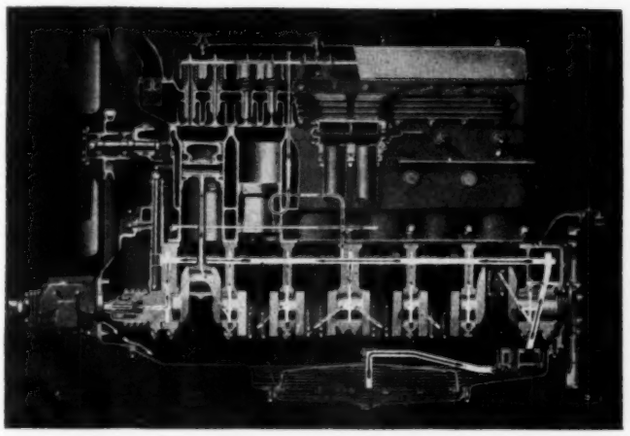
The Benefit of a Heated Garage

All equipment should be kept in a heated garage when not in service. Mechanics cannot work efficiently when the temperature is near the freezing point and it has been found that under such unfavorable conditions the equipment does not get those minor repairs and adjustments that are required for satisfactory operation. Drivers get into a hypercritical mood when they are required to start their run in a cold motor coach, and it is more difficult to get them to observe the simple rules of proper cold weather starting and driving.

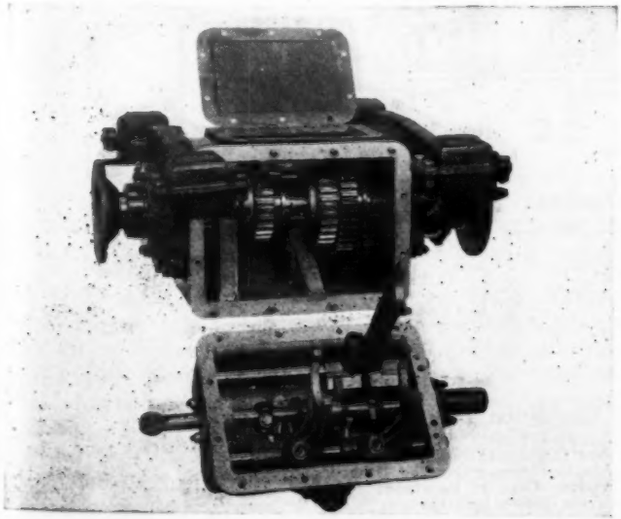
One of the most important considerations is proper lubrication of the motor. As a general rule, a motor oil to be suited to cold weather operation must:

A—Flow freely at zero
B—Develop a minimum of carbon residue
C—Show no tendency to gum
D—Have adequate operating viscosity to withstand dilution

An oil of low pour test will flow more readily through the oil lines and give better protection to all bearing surfaces when they are chilled. This point of congealment can be controlled somewhat during the refining process by extracting as much as possible of the paraffin wax. Lubricating oil, which is composed of a mixture of several hydrocarbons, solidifies at various temperatures, depending on its composition, and in this respect is unlike water or other liquids that freeze at a given temperature. In selecting a winter oil the important point is to obtain an oil which will have a correct viscosity at all temperatures to which it will be subjected. It is not only important that it have a low pour test, but also that it hold its body at maximum operating temperatures. The grades of oil recommended for summer use usually have a pour test which makes them relatively sluggish in winter and there is possibility of damaging the motor before they are sufficiently viscous to flow. For this reason the oil companies recommend the use of a lighter grade in winter than in summer.



Sectional View of White Model 54 Engine Showing Lubrication System



Mack BK Transmission with Side Inspection Plate Removed. Note Large Lubricant Capacity

Dilution of Crankcase Oil

The dilution of the crankcase oil by unburned fuel occurs much faster in winter than in summer, due to excessive choking and to the heavy ends of the fuel not being entirely vaporized when the engine is cold. This dilution, if allowed to continue, reaches a state of equilibrium depending on the operating conditions and the kind of fuel and lubricating oil used. Some operators believe that this dilution reduces a summer oil to the correct body, but a careful analysis will usually show either that the oil has not been greatly thinned or that the dilution has continued to a point where a heavy demand on the engine would result in the protective oil film being burned off and the cylinder walls badly scored. All oil companies recommend that the oil be drained at frequent intervals, usually every 500 miles, but this will depend to a large extent upon the mechanical condition of the motor. Particular care should be given to keeping the crankcase free of water which, if allowed to freeze, will usually damage the oil circulating pump.

Control of engine temperature is an important factor

in keeping lubrication and fuel systems in proper working order and some method should be provided to allow the driver to know whether his engine is too cold for a heavy power demand or too hot for continued operation. For temperatures of less than 25° F. a radiator shutter should be used to keep the engine from running too cool with the resulting incomplete vaporization of the gasoline. With the present fuels containing a large percentage of heavy distillates it is increasingly difficult to get complete vaporization and it will be found good maintenance practice to have all carburetors cleaned and correctly adjusted for cold weather requirements and the hot air intake opened. Water in the gasoline system should be guarded against, due to the possibility of it freezing. This is one of the most difficult troubles to locate and remedy, and it is often the cause of a two or three hour delay in the schedule. If the vehicle is stored in a heated garage and driven out in very cold weather the moisture in the air trapped in the tank will condense and gradually accumulate at the lowest point.

Anti-Freeze Hydrometer

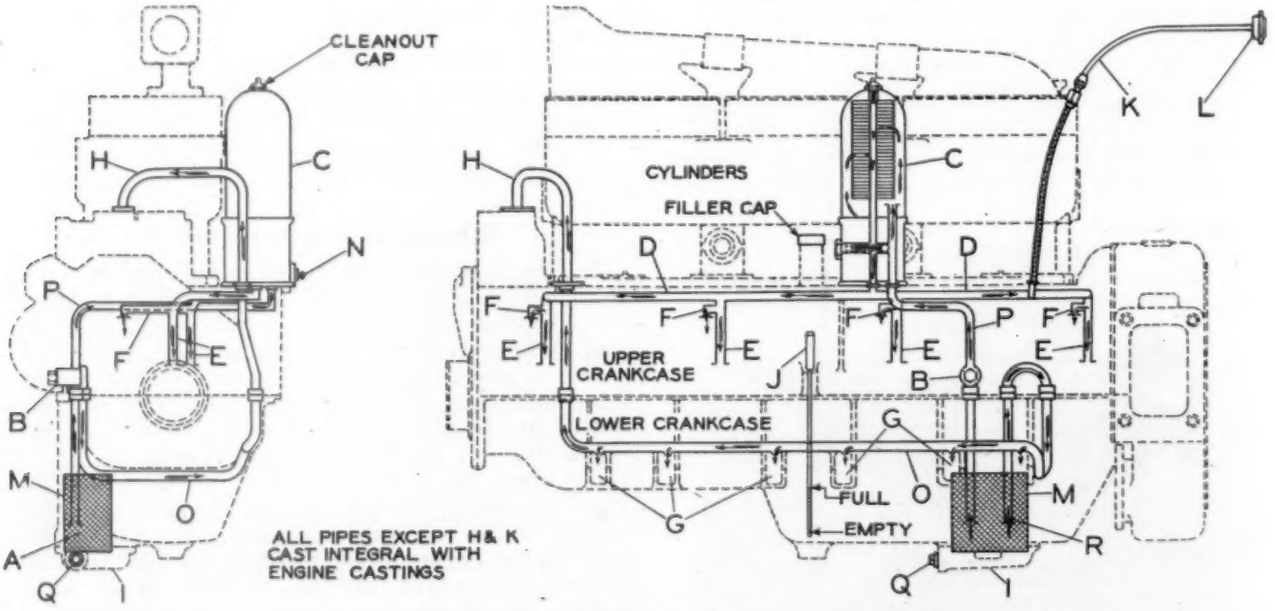
The standard grades of straight mineral gear lubricants congeal at about 15° F., and below this temperature do not give complete protection to the gears and bearings of the transmission and differential. To assure complete lubrication at temperatures below 15° F. the gear lubricant should be thinned down in the proportion of two parts of gear lubricant to one part of low pour test motor oil. Unless extreme weather conditions prevail, the chassis lubricant need not be changed, since this work is generally done in a heated garage and the lubricant oil will be of the correct viscosity.

There are two points that require particular attention, one of which is the drive shaft universal joints. The centrifugal force tends to throw off a light lubricant which would have the correct body for cold weather use. A lubricant should be selected which has sufficient body and adhesive qualities to remain in the joint but not be heavy enought to congeal and cease to flow to the moving parts. The other is the rear axle bearings. A suitable lubricant must resist the effect of considerable heat from the brakes and yet give complete protection to the bearings at the lowest outdoor temperature.

Amount of Denatured Alcohol to Use for Protection to Temperature Indicated

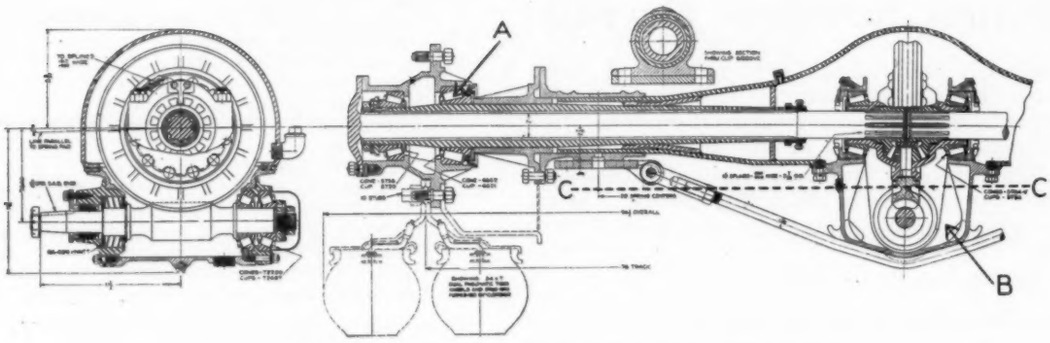
Capacity of Cooling System in Quarts	Above Zero			Zero	Below Zero	
	+20 Deg. (Quarts)	+15 Deg. (Quarts)	+10 Deg. (Quarts)	+0 —1 (Quarts)	—10 Deg. (Quarts)	—20 Deg. (Quarts)
12	2½	3	3½	4½	5¼	6
13	2½	3¼	3¾	5	5¾	6½
14	2¾	3½	4	5¼	6	7
15	3	3¾	4½	5¾	6½	7½
16	3¼	4	4¾	6	7	8
18	3½	4½	5¼	6¾	7¾	9
20	4	5	5¾	7½	8½	10
22	4¼	5½	6½	8¼	9½	11
24	4¾	6	7	9	10¼	12
26	5	6½	7½	9¾	11¼	13
28	5½	7	8¼	10½	12	14
30	5¾	7½	8¾	11¼	12¾	15
32	6¼	8	9¼	12	13¾	16
34	6¾	8½	9¾	12¾	14½	17
36	7	9	10½	13½	15½	18
40	7¾	10	11½	15	17	20
44	8½	11	12¾	16½	18¾	22
48	9¼	12	13¾	18	20¼	24
52	10	13	15	19½	22¼	26
56	10¾	14	16¼	21	24	28
60	11½	14¾	17¼	22½	25½	30
64	12½	15¾	18½	24	27¼	32

The use of an anti-freeze solution in the radiator is essential when the outdoor temperature is below 32° F. and the motor vehicle is allowed to stand longer than 30 minutes. The United States Bureau of Standards has developed a specification for an ideal anti-freezing preparation as follows:



Mack Model BK Engine-Oil Circulation Diagram

A—Circulating Pump
{ Pressure Feed System
{ Splash Feed System
B—Pressure Relief Valve
C—Oil Filter
D—Distributing Pipe for Main Bearings
E—Branch Pipes to Main Bearings
F—Branch Pipes to Camshaft Bearings
G—Troughs for Splash Lubrication
H—Overflow Pipe Leading Oil to Gear Train
I—Collecting Tank (Sump)
J—Gage (Oil Level in Crankcase)
K—Pipe to Pressure Gage on Dashboard
L—Pressure Gage on Dashboard
M—Screen Which is Removable With Oil Pump from Bottom of Engine
N—Filter Drain
O—Distributing Pipe to Troughs
P—Pipe to Oil Filter
Q—Drain Plug
R—Pressure Reducing Plug



Sectional View of a Timken-Detroit Worm Drive Rear Axle
A, Wheel Bearings Which Require a Heavy Grease. B, Differential Housing Using a Special Gear Lubricant. C, Level to Which Housing Should be Filled

1. The preparation should be readily obtainable.
2. It must prevent freezing at the lowest temperature which the vehicle may encounter.
3. It must not be injurious to the metal or rubber of the cooling system.
4. It should not lose its anti-freezing properties after continued use.
5. It should have a minimum fire hazard.
6. It should not congeal at any operating temperature.
7. The boiling point of the mixture should be nearly the same as pure water.
8. It should be a good conductor of heat.

Before any anti-freeze solution is put into the cooling system the water jacket of the engine and the radiator should be thoroughly flushed clear of scale and rust. Cooling systems of engines that have been in service for any length of time usually contain accumulations of rust and scale that anti-freeze preparations have a tendency to loosen. It is, therefore, important that the system be thoroughly cleaned so as to prevent the possibility of the cooling system circulation becoming impeded. One of the most important points about an anti-freeze compound is that it be maintained at the proper concentration during the entire winter. To insure its complete efficiency any leak in the radiator or pump must be repaired and hose connections and gaskets must be tightened or replaced. A thermo-hydrometer, as shown in the illustration, should be used to check the concentration of the solution at frequent intervals.

Amount of Eveready Prestone (in gallons) to use for protection to temperatures indicated

Capacity of Cooling System in Gallons	10 Degrees Above Zero	Zero	10 Degrees Below Zero	20 Degrees Below Zero	30 Degrees Below Zero
2	½				1
2½			1		1½+
3		1			1½
3½	1			1½	2+
4	1		1½		2
4½		1½		2	2½+
5	1½		2		2½
5½	1½	2		2½	3
6	1½	2	2½		3
6½	2		2½	3	3½
7	2	2½		3	3½
7½	2	2½	3	3½	4
8	2	2½	3	3½	4
8½	2½	3	3½	4	4½
9	2½	3	3½	4	4½
9½	2½	3	4		5
10	2½	3½	4	4½	5
10½	3	3½	4	4½	5
11	3	3½	4½	5	5½
11½	3	4	4½	5	5½
12	3	4	4½	5½	6
12½	3½	4	5	5½	6
13	3½	4½	5	5½	6½
13½	3½	4½	5½	6	6½
14	3½	4½	5½	6	7
14½	4	5	5½	6½	7
15	4	5	6	6½	7½
15½	4	5	6	7	7½
16	4	5½	7	7	8
16½	4½	5½	6½	7	8

Denatured alcohol is extensively used and is easily obtained at reasonable cost. It has no injurious effect on the cooling system and, if the concentration is kept up to a predetermined standard, gives complete protection. The boiling point of a mixture of alcohol and water is lower than that of pure water due to the boiling point of alcohol being 174° F. and water 212° F. which results in a more rapid loss of the alcohol.

A solution of ethylene glycol sold under the trade name of Eveready Prestone is widely used, due to its ability to resist evaporation. Its boiling point is 387° F. and when mixed with water raises the boiling point slightly.

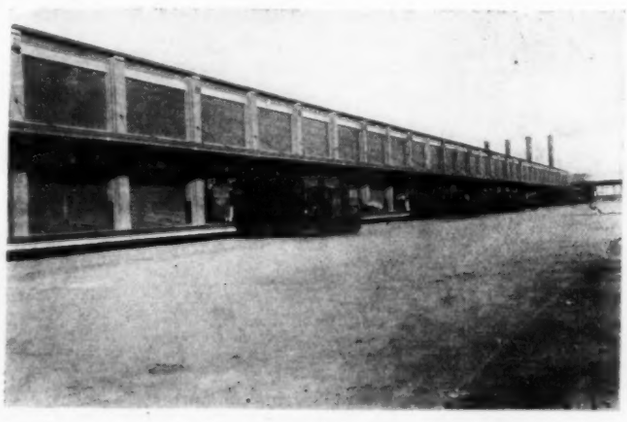
It is non-corrosive and has no injurious effect on varnish and lacquers, has no odor and is non-inflammable. The tables indicate the amount of alcohol or Prestone to be used to obtain protection at any desired temperature.

Westinghouse air brakes are used on some equipment and the reservoirs or pressure tanks should be thawed out at regular intervals so that the condensate may be drained off.

There is but little danger of the lead-acid storage battery freezing unless it becomes less than half charged. The freezing points of various degrees of charge is given below:

sp. gr 1.150—battery discharge ..... 10° above 0° F.
sp. gr. 1.175—battery ¾ charged ..... 5° below 0° F.
sp. gr. 1.200—battery ⅔ charged ..... 20° below 0° F.
sp. gr. 1.250—battery ⅓ charged ..... 50° below 0° F.
sp. gr. 1.300—battery fully charged..... 65° below 0° F.

* * *



New Haven Express Transfer Terminal at New York

Inspection Schedule Devised

BY SECURING from a large number of motor coach companies copies of their inspection schedules and comparing them, the rolling stock committee on motor coaches of the American Electric Railway Engineering Association prepared a composite motor coach inspection schedule and presented it at the recent annual convention of that organization in Atlantic City, N. J.

The composite schedule follows:

Inspection Schedule of Large Motor Coach Operating Companies

1. Cooling System
   - Inspect for leaks—core—hose—manifold and drain cocks.
   - Inspect radiator fastenings.
   - Inspect water pump.
   - Inspect fan—bearings—brackets and belt.

2. Engine
   - Run engine—note knocks—oil pressure—gasket and oil leaks
   - Tighten engine mountings.
   - Inspect timing chain, and adjust when required.
   - Inspect valve clearances, valve springs and retainers.
   - Check valve or sleeve timing if required.
   - Check compression—grind valves or clean sleeve valve ports, when required.
   - Tighten cylinder head nuts—check exhaust and intake manifold nuts.
   - Remove and examine all spark plugs.
   - Clean air and oil filters.
   - Inspect spark, throttle and choke connections.
   - Replenish engine oil or drain—clean screens and refill.
   - Inspect air compressor—drive and compressor governor.

3. Ignition
   - Inspect magneto or distributor for proper gap, mounting and drive.
   - Excessive wear in breaker mechanism.
   - Timing.
   - Loose connections, terminals and wires.
   - Cracked or leaking distributor heads.

4. Fuel System
   - Inspect carburetor.
   - Clean all fuel screens and traps.
   - Inspect vacuum tank and electrical or mechanical fuel pumps.
   - Inspect all connections and lines for leaks and fastenings.
   - Inspect tank for leaks and faulty mounting.

5. Electrical System
   - Inspect generator for:
     - worn brushes or weak springs;
     - worn or dirty commutators;
     - faulty head wires;
     - grounds;
     - mountings.
   - Inspect starter and switch—note starting of engine.
   - Inspect battery gravity, water and connections.
   - Inspect lights—switches—junction boxes—buzzers—horn—windshield cleaner—ventilating and heating fans, etc.

6. Clutch
   - Inspect clutch for:
     - pedal clearance;
     - slipping;
     - releasing.
   - Drain, wash and refill.
   - Lubricate throw out bearing.

7. Transmission
   - Inspect transmission drive shaft bearings for excessive play.
   - Inspect gear shifting mechanism.
   - Inspect mounting.
   - Replenish oil or drain and refill.

8. Drive Line
   - Inspect universal joints.
   - Inspect bearings and bearing mountings.
   - Inspect companion flanges.
   - Lubricate.

9. Rear Axle Assembly
   - Check wheel bearings for excessive play.
   - Tighten wheels and hubs.
   - Tighten spring "U" bolts.
   - Inspect spring shackles for wear.
   - Inspect springs for broken leaves.
   - Inspect torque tube and radius rods for wear and adjustment.
   - Check differential for back lash.
   - Check for oil leaks.
   - Check differential carrier hold-down nuts.
   - Replenish or drain and refill differential.
   - Grease or repack wheel bearings.
   - Lubricate spring shackle pins.
   - Lubricate torque rod or radius rods.

10. Brakes and Brake Rigging
    - Inspect brake shoes—linings and drum.
    - Inspect all levers—rods and connections.
    - Inspect cams and camshaft bushings.
    - Adjust and equalize brakes.
    - Inspect air or hydraulic lines, diaphragms and pistons for leaks.
    - Check air valves for proper operation.
    - Inspect air gauge and regulator valve.
    - Drain air tanks.
    - Inspect and adjust hand brakes.
    - Lubricate all pins and bushings.

11. Front Axle and Steering
    - Inspect fron axle.
    - Check wheel alignment.
    - Tighten wheel nuts.
    - Inspect wheel bearings—king pins.
    - Tie rods, drag links and steering arm.
    - Inspect steering post mounting.
    - Inspect steering gear adjustment.
    - Tighten spring "U" bolts.
    - Inspect spring shackles for wear.
    - Inspect springs for broken leaves.
    - Inspect and adjust shock absorbers.
    - Grease or repack wheel bearings.
    - Lubricate spring shackles and steering connections.
    - Replenish oil in steering and gear case.
    - Lubricate shock absorbers.

12. Chassis
    - Inspect for loose rivets, bolts and sprung or cracked frame.
    - Check exhaust lines and mufflers for leaks, mountings and back pressure.
    - Inspect fenders and fender fastenings.
    - Inspect hood and hood fastenings.
    - Inspect bumpers and bumper mountings.

13. Body
    - Examine seat covers, cushions and back, and see that no projecting points can damage clothing or injure passengers.
    - Examine pedestals and seat fastenings.
    - Inspect fire extinguisher.
    - Inspect heating system.
    - Inspect destination sign and operating mechanism.
    - Inspect all other signs.
    - Inspect windows and operating mechanism for rattles and operation.
    - Inspect doors for rattles and operation.
    - Inspect door operating mechanism.
    - Inspect treadle switches and door engines on pneumatic doors.
    - Tighten all body bolts.
    - Inspect drivers curtain.
    - Inspect floor and floor covering.
    - Inspect fare box or register.
    - Inspect drapes and interior of coach for cleanliness.
    - Inspect roof and body panels.
    - Inspect ventilators.
    - Inspect luggage and tire carriers.
    - Inspect windshield.
    - Inspect speedometer.
    - Test windshield wiper.
    - Inspect license plates.

14. Tires
    - Check pressure.
    - Check for body striking tires.
    - Inspect for cuts in casings, stone bruises, weak cases or exceptionally worn treads.

New Equipment

Large Capacity High-Powered Yellow Coach

GENERAL Motors Truck Company, Pontiac, Mich., announces a new motor coach of large seating capacity, equipped with a newly designed high powered engine. The new Yellow model 750, with 150 h.p. overhead valve engine, affords a liberal increase in power output over previous models without adversely affecting fuel economy and operating expense.

The bore is 4⅞ in. and the stroke 5½ in., giving a piston displacement of 616 cu. in. A distinctive feature of the new engine is the overhead valve equipped with the Zero-lash system, which eliminates valve adjustment and insures valve silence. All oil is pumped through a water cooler before it reaches the engine bearings to maintain the correct viscosity essential to proper lubrication. A force-feed system supplies oil to all bearings and valve rockers.

Dual carburetors of the down-draft type are fitted with exhaust heated vaporizers controlled from the dash, and oil wetted type air cleaners.

Water is circulated by a centrifugal pump and cooled by a 21 in. diameter fan which is mounted on roller bearings and is driven by a dual belt.

The upper and lower halves of the crankcase are cast of aluminum with the exceptionally wide joint faces held together by closely spaced bolts to prevent oil leakage. The heat-treated crankshaft is counterbalanced and has a main bearing diameter of 2¾ in. and a connecting rod bearing diameter of 2½ in. The Delco, dual type, 12-volt ignition system is used with two spark plugs per cylinder. The generator has a capacity of 600 watts and is equipped with automatic current and voltage regulation.

The body of the new coach is 8 ft. wide, 26 ft. 4⅝ in. long and has 79 in. of headroom. Four optional seating layouts are available with seating capacities of 30 to 41 passengers.

A baggage compartment in the rear is entered through a sedan type door located at the rear of the right side of the coach. The front entrance door is 31 in. wide and has 6 ft. headroom.

The body frame is constructed of ash, rigidly braced and with the exterior covered with sheets of aluminum which are easily detachable for repairs. All windows have brass sash with double strength glass and may be raised or lowered by heavy duty crank-type regulators.

The roof is made of a veneer laid over slats and covered with a high grade top decking. The front corners are made of hammered aluminum thus making a rigid and waterproof construction.

The lower side panels of the interior are covered with fabric leather to harmonize with the seat covering material. The roof and outside of the baggage racks are finished in light grey enamel. All hardware is bright nickel finish and the floor is covered with battleship linoleum.

There are seven roof ventilators of large capacity with metal ventilator eaves over each side window. The windshield has a metal frame and a ventilator at the top. Electric wiring is thoroughly protected throughout the body by metal conduit or loom.

The interior is illuminated by seven dome lights in

41-Passenger Heavy Duty Yellow Coach Model 250

View of Interior Showing Reclining Seats and Luggage Racks

the center aisle and fourteen individual reading lights, the later individually controlled by the passenger. Front and rear marker lights are furnished with optional lens colors. The entire lighting system is under the direct control of the driver. A signal cord is placed on each side of the coach above the windows in a position convenient for the passengers. Sunfast, washable curtains are fitted to all side and rear windows.

A metal sun visor running across the front of the coach gives protection to a built-in illuminated destination sign. A similar rear visor, made of heavy gage sheet metal, is striped to represent awning canvas.

The bodies have, as regular equipment, reclining chairs with arm and head rests, a blower heating system with two electric fans to circulate the heated air, and inside luggage racks of large capacity running the full length of the body on both sides. A chromium plated ornamental grill made of spring steel surrounds the two spare tire carriers on the rear.

The chassis frame has pressed steel side bars and eight cross members, four of which are tubular. The semi-elliptic front and rear springs are made of heat-treated alloy steel and are fastened to the frame by metal shackles. An underslung worm and wheel axle is used with a choice of gear ratios of 4.4 to 1; 5.2 to 1 standard; 6.25 to 1 and 7 to 1.

Four-wheel Westinghouse air-operated service brakes and internal expanding hinged shoe type emergency brakes, operating on two 11 in. drums mounted on the propeller shaft, are regular equipment.

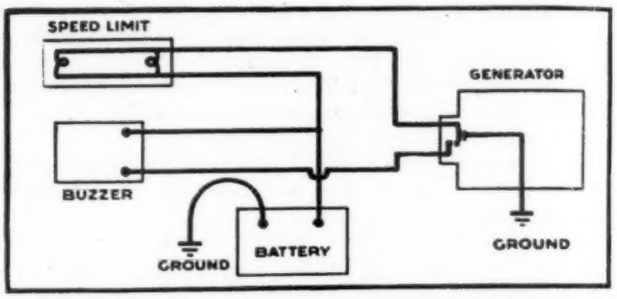
All brakes shoes have the block type liners and all brake drums are of heavy section gun iron. The wheels are made of pressed steel, dual at the rear with rims 22 in. in diameter fitted with 40 in. x 9.75 in. 12-ply balloon tires. The tubular propeller shafts have metal universal joints with a rubber ball type cushion joint between the clutch and transmission. The cam and lever steering gear is mounted on the side of the frame with the reduction and leverage arranged for easy steering.

The transmission is separately mounted with three-point suspension and has four speeds forward and one reverse with ratios of: Reverse, 5.24 to 1; first speed, 4.25 to 1; second speed, 2.87 to 1; third speed, 1.70 to 1 and fourth speed, direct drive. The gear shaft lever is mounted on an extension on the transmission and is operated by the driver's right hand. The emergency brake lever is also at the right of the driver. The front axle is the reverse Elliott type with wheel loads taken on specially designed king pin thrust bearings and taper roller wheel bearings. The ball and socket tie rod joints are adjustable. The clutch is the single disc type and is cooled by an induced air current. Chassis equipment includes a 70-gal. gasoline tank, hydraulic type shock absorbers, front and rear bumpers, 100 amp. hr. 12 volt battery, AC fuel pump, with integral strainer, and head, tail and stop lights.

Speed Signal for Driver Control

THE Twin-Coach Corporation, Kent, Ohio, has developed a speed-signal the basis of which is a signal and buzzer operated by electricity in plain view of the passengers. With this system, the coach riders become a part of the driver control system.

There is a flash "Speed Limit" bulletin situated directly above the driver's head in the coach, which is



Wiring Diagram of Signal. Note Generator Connection

wired to the generator in such a manner that when the operator approaches within two or three miles of the reasonable speed limit, the passengers see flashing in red the words "Speed Limit." Upon reaching the ex-

The Signal is Placed in a Prominent Position

act speed limit agreed upon, a buzzer sounds in a tone which is audible to all of the passengers.

The device informs both the driver and passengers of the maximum allowable speed but does not cut off the power of the engine if it is needed for a traffic emergency.

Mack Brings Out Light Six-Cylinder Motor Coach

A COMPACT, 90 horsepower, six cylinder motor coach chassis which provides more power and greater flexibility than the four cylinder type and yet can be operated more economically than a big six, has been announced by Mack Trucks, Inc., New York City. The new model BC is offered as an intermediate six designed for use on those routes having grades or traffic conditions requiring more than four cylinder power, yet where passenger carrying requirements do not warrant the cost of a big six.

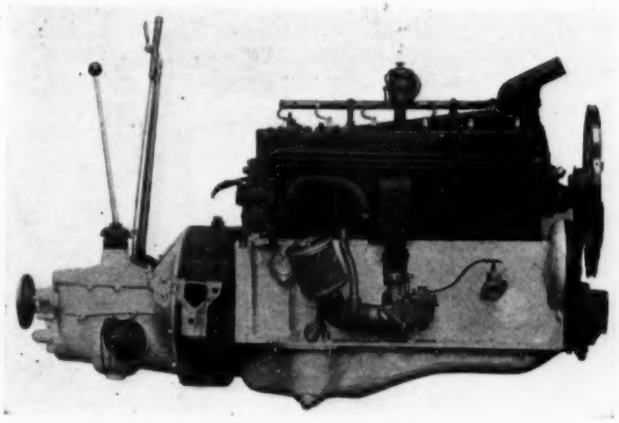
The new model is powered by a six cylinder engine developing ninety brake horsepower. It has a bore of 4 in. and a stroke of 5½ in. giving a piston displacement of 404.4 cu. in., and develops a maximum torque of 276 lb. ft. at 1400 r.p.m.

The heat-treated cylinder block is fitted with a demountable head which is cast in one piece and has offset high-compression chambers. The compression ratio is 4.8 to 1.

The pistons are constructed of light weight cast iron, 5 in. long, with three ⅛ in. compression rings and one $\frac{3}{16}$ in. oil control ring, and have full-floating piston pins 1⅛ in. in diameter and 3⅝ in. long. The connecting rods are tubular, machined all over and are made of drop-forged molybdenum steel. Bearings are direct-babbitted and are diamond-bored, the diameter being 2½ in. and the length $1\frac{3}{16}$ in.

The crankshaft is mounted on seven main bearings and is made of low-carbon steel case-hardened. It is counterbalanced with separate counterweights. The main bearings are 3 in. in diameter and the lengths are: front, 2¼ in., center, $1\frac{1}{16}$ in.; and rear, 3⅛ in., with the intermediate bearings, 1⅜ in.

The four bearing crankshaft and the valves are mounted on the right side of the engine. The inlet valve is made of chrome nickel steel, and the exhaust valve, chrome silicon steel. The water pump is combined with the fan support on the front of the cylinder block. A crank-case ventilation system is connected to the carburetor cold air duct. The distributor of the ignition system is mounted on the top of the cylinder head where it is readily accessible for adjustment. Throttle-controlled exhaust heat about the vertical section of the intake manifold and a high pressure oiling system are interesting features of the new engine.

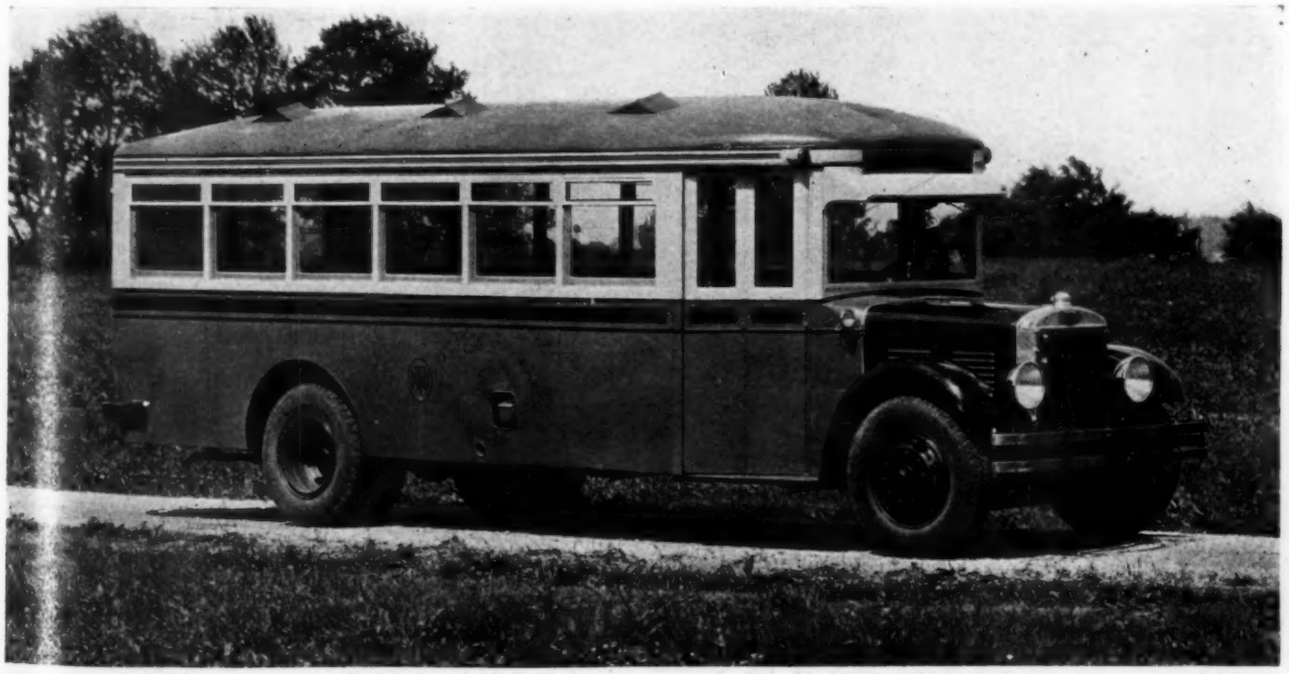


New Mack Model BC Engine

The clutch is the single plate dry type of standard Mack design, and the transmission, mounted integral with the motor, has four speeds forward and one reverse.

All spring tips, the radiator, steering wheel, steering column and four front outrigger body mountings are rubber shock insulated. The final drive is of the single reduction, hypoid gear type having full floating shafts in a one-piece, drop-forged, chrome-nickel steel banjo type axle with gears which are retained in a steel carrier.

The model BC has four-wheel service brakes with



Mack Model BC Light Six Motor Coach

Front View of New Model with City Type Body

the braking pressure augmented by a vacuum booster. The hand brake is mounted independently on the drive shaft and the total braking area is 750 sq. in.

The chassis frame is of the rigid type, is rectangular and flat on top, with tapered side rails and tubular cross-members, and is constructed of heat-treated chrome nickel steel. The side members are 8 in. deep, $2\frac{5}{16}$ in. wide and $\frac{5}{16}$ in. thick.

The coach is available in two standard wheelbase lengths of 202 in. and 231 in., giving respective turning circles of 68 ft. and 74 ft. The 202 in. wheelbase chassis has a passenger capacity of 25 when the seats are spaced 34½ in. apart. The 231 in. wheelbase model seats 29 passengers with 32 in. seat spacing and 33 passengers with 29 in. seat spacing.

Three types of bodies are available for the chassis, a city type, an interstate observation type with inside baggage space, and a low head room observation type with roof baggage space. These bodies are of standard Mack manufacture featuring a steel base and a wood frame with all paneling of aluminum. Deep spring seats with individual backs upholstered in genuine grain leather insure riding comfort.

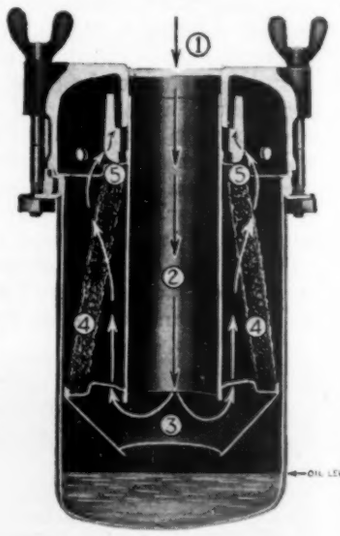
Interior View Showing the Arrangement of the Control Mechanism to Provide as Much Space as Possible for Entering Passengers

AC Triplex Air Cleaner

A NEW, long life, heavy duty air cleaner, designed especially for motor coaches, trucks and tractors is announced by the AC Spark Plug Company.

The cleaner is called the "Triplex" because it not only has three stages of air cleaning but also serves a triple function; viz, air cleaner, flame arrestor and carburetor muffler.

The first stage of the cleaning is through the stack or chimney on top of the cleaner which supplies air from high up under the hood, or, in the case of a tractor, three or four feet above the cleaner where the air supply is relatively pure. The second stage of cleaning results from the sudden reversal of the air current throwing most of the dust into the oil supply in the bottom of the cleaner. The third stage is the hollow cone of oil-wetted copper mesh through which the air passes on its way to the carburetor. This third stage removes the small percentage of dust not removed in the second stage.



New AC Air Cleaner

1. Dust laden air enters cleaner from chimney or stack. (Not shown.)
2. Column of dirty air passes downward through central tube.
3. Dust laden air enters oil chamber and due to impact and sudden reversal, most of dust is thrown into the oil and settles to bottom.
4. Partially cleaned air passes upward into the second stage cleaner where all remaining dust is caught by the oil-wetted filter.
5. Cleaned air flows to carburetor intake.

Tests have shown that nearly all of the dust entering the cleaner itself is collected in the oil supply, leaving only a small portion to be caught on the last stage. The dust holding capacity of the cleaner is, therefore, very great, and as a result it will operate for long periods without attention. When it needs attention, the second and third stages can be easily cleaned. This is simply done by loosening the two wing studs. Both the oil chamber and copper mesh are cleaned with gasoline or kerosene, then the copper mesh is re-oiled and the oil chamber filled with fresh crankcase oil to the indicated level.

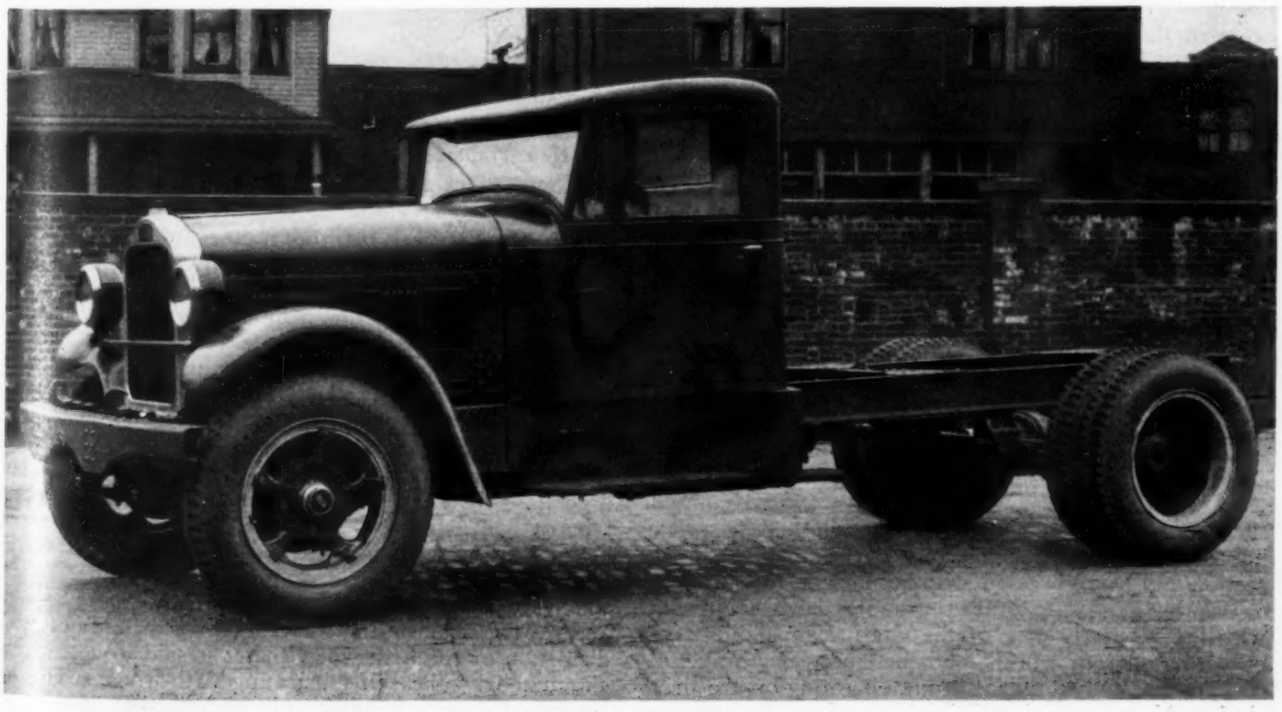
The air capacity of this cleaner is very high and there is no loss of oil into the carburetor under normal conditions of air flow.

New White Six-Cylinder Truck for Heavy-Duty Operation

THE White Company, Cleveland, Ohio, has announced a heavy-duty truck chassis which is designed for special transportation needs and is sold only on the company's specifications, which are based upon a detailed study of the kind of operation for which the truck is to be used. This new tractor-truck has been designed to provide higher average speed, greater capacity and more power in the transportation of extremely heavy loads. The new model 59 is practically a custom built truck, using standard units, which are specified only after a complete study is made of all operating factors. Being built to specifications, the new model is available in a variety of wheel bases as a regular four-wheel chassis or as a six-wheel tractor type with drive on all four rear wheels. It is especially suited for trailer operation and for relatively high-speed operation as a heavy duty truck.

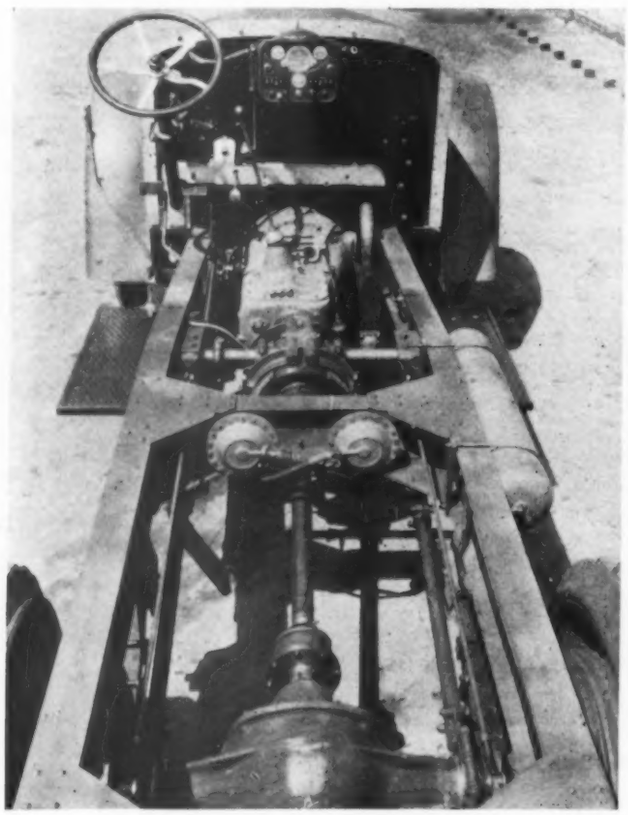
The engine is a six-cylinder, overhead valve type, developing 100 horsepower, and is essentially the same as that used in the Model 54 motor coach. It has a bore of 4⅜ in. and a stroke of 5¾ in. The crankshaft is statically and dynamically balanced and is supported

New White Model 59 Truck Chassis



Model 59 as a Tractor

by seven large diameter bearings. The cylinder head, valves and valve mechanism can be removed together for quick and efficient valve grinding and carbon cleaning operations. The temperature of the engine is thermostatically controlled, and positive water circulation



Chassis Details of the New Model

is assured by a gear driven centrifugal pump. A positive flow of oil is furnished by a gear-driven pump located in the crankcase. Oil is forced under pressure to main, camshaft, connecting rod, wrist pin, chain idler gear and air compressor bearings. Clean oil is assured by reversed flow screening.

Electrically synchronized, two spark ignition is furnished by a dual distributor. The carburetor is the compound jet, plain tube type, equipped with an air cleaner and fitted to a six port, down draft, inlet manifold with an exhaust heated riser to assist perfect atomization of the fuel.

The two plate, dry type clutch and the transmission are mounted on the engine. The transmission has four speeds forward and one reverse, with ratios of: first speed 5.05 to 1; second speed, 2.68 to 1; third speed, 1.64 to 1; fourth speed 1.00 to 1; reverse, 6.38 to 1. All gears are ground for quiet operation.

Gasoline is supplied by three Auto-pulse pumps located on the engine frame.

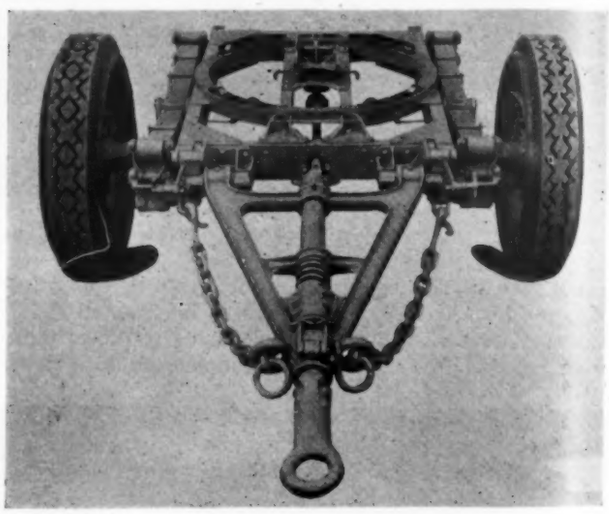
The large capacity radiator has a cast aluminum shell and a removable core which is mounted on a flexible support. The frame is 8 in. deep of I-beam cross-section and has a pressed steel bumper on the front.

Westinghouse air brakes are standard equipment, with the service brakes, of the internal expanding type, operating on four wheels, and the emergency brake, directly connected to a dual drum, operating on the drive shaft. Air pressure is obtained by a 6 cu. ft. compressor mounted on the engine. This system of braking can also be used on a trailer, if necessary, by a direct hose connection.

All springs are semi-elliptic and are made of alloy steel. The drive is through Spicer metal universal joints. The front axle is the reverse Elliot type and of I-beam cross-section. The special, heavy duty rear axle is the double reduction gear type with ratios available of 13.3 to 1, 11.7 to 1, 10.1 to 1, 9.33 to 1, 8.87 to 1 and 7.63 to 1.

Trailmobile Designs Self-Lubricating Fifth-Wheel

THE Trailmobile Company, Cincinnati, Ohio, has designed an improved four-wheel trailer in which is incorporated a self-lubricating fifth-wheel. This fifth-wheel consists of an upper and lower section, the base or lower section being of heavy cast steel, with four large integral oil reservoirs. In each reservoir are two rollers, which, by light spring pressure



The New Trailmobile Self-Lubricated Fifth-Wheel Assembly

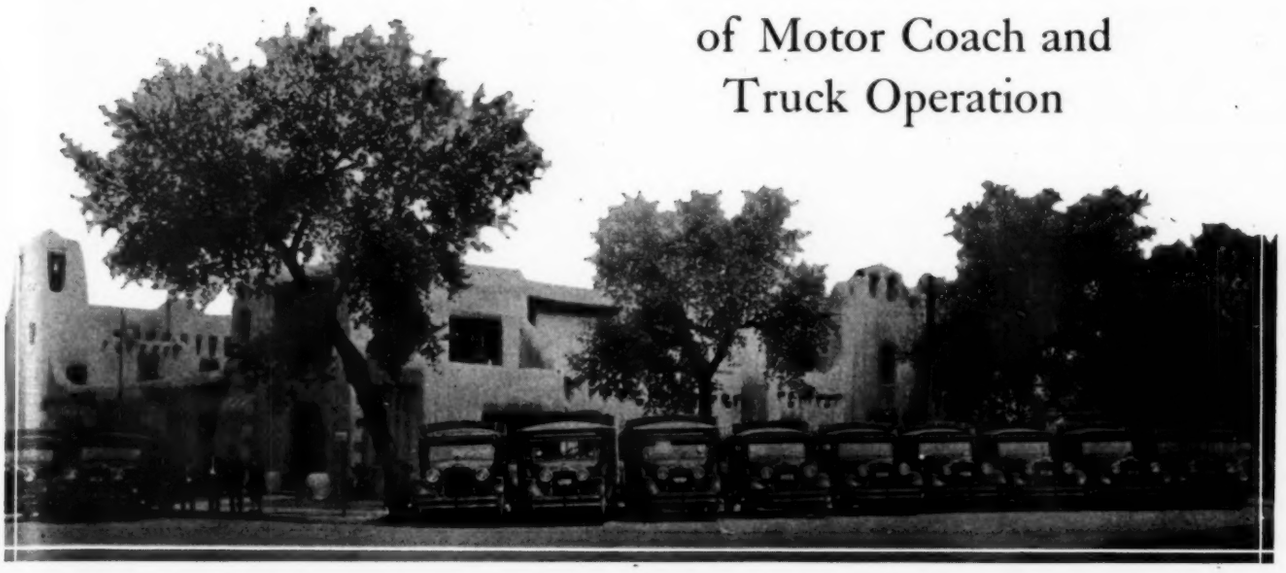
against the upper circle, agitate the oil with each turn of the front wheels of the trailer and thereby keep both plates correctly and thoroughly lubricated at all times.

These rollers do not support any weight, their only function being to lubricate the circles. The oil reservoirs are filled through Alemite fittings, conveniently placed outside of the frame.

The advantages claimed for this principle are complete lubrication at all times, assurance of an even, smooth surface, and reduction of more than one hundred possible wearing parts. Under the roller bearing type of fifth-wheel formerly used, the hard steel roller bearings, after a time, would indent the upper and lower plates, making it necessary to take the trailer apart, remove the rivets in both plates, turn the plates around and re-rivet them to the trailer. The possibility of such distortion of the fifth-wheel plates is said to be entirely eliminated by the self-lubricating fifth-wheel. The oil reservoirs require refilling only periodically.

Every-Day Problems

of Motor Coach and Truck Operation



This Month's New Questions

Question No. 10

Developing Special Party Business

"In attempting to develop special party business for chartered motor coach service, is it better to depend upon solicitation by regular traffic agents of the motor coach company or the railroad owning it, or to employ a special solicitor to handle this work? What are the best sources of traffic of this kind? Is advertising worth while, and if so, in what kinds of publications? Are any particular types most in demand? What rates are generally charged for this service?"

Question No. 11

Getting Employees to Use Their Brains

"We have tried to get our employees to hand in suggestions or new ideas about ways in which operation or maintenance work can be done better or more economically, but without much success. Do other motor coach operators solicit similar suggestions from their employees, and are they getting good results? What means do they employ to get their men to make such suggestions? By whom are the suggestions passed upon? Do they pay for such suggestions or new ideas that are put into effect, or is there some other kind of reward?"

What Is Your Answer?

Replies to Question No. 6

Insurance for Motor Coach Operators

"What have the various railway motor coach companies found to be the most satisfactory method of handling insurance? Do they adopt generally the method of straight insurance on the individual-coach basis; do they find it preferable to place the insurance on a gross income basis; do they find it desirable to carry all the risk themselves; or do they find it expedient to carry the risk in the lower amount—say, up to $25,000 for any one accident—themselves, and farm out the higher amount, up to, say, $100,000 for any one accident, with independent insurance companies?"

Insurance Contracted For

Due to the fact that this company has been in the process of development for the past year, no serious consideration has been given to insurance on a gross receipts basis. Our insurance coverage is contracted

for through an outside concern, on the individual coach basis. The benefits obtainable from the gross income class can only be ascertained when the gross receipts is a known factor, in which case it is a case of mathematical computation and comparison with the other types of insurance.

As to the desirability of carrying all the risk ourselves, we are without sufficient data, due to the comparative short period of our operations, to give this due consideration.

The company has considered the advisability of carrying "catastrophe" insurance, assuming all risk under $25,000 ourselves; but in giving due consideration to the difference in cost as compared to the extra expense involved by an additional organization necessary to take care of the minor and petty claims, this was not considered advisable. However, this plan may be practicable for operations of a larger size, in which case the cost of additional personnel may be more than offset by the additional cost of carrying complete insurance coverage.

The policy covering liability insurance for our operation is limited to $20,000 for any one person and $150,000 for any one accident, and, as stated above, is on the individual coach basis.

A. C. Tosh,
Superintendent, Reading Transportation Company.

Three Forms of Insurance in Effect

We have in effect at present three separate and distinct forms of insurance. We have been attempting to make arrangements with several different companies to carry the coverage above ten thousand dollars. So far, we have met with very little success but still believe that this is the logical manner in view of the fact that we, like many other organizations of our kind, have our own claim department whereby we can automatically make quicker and cheaper settlements in small amounts than can be made by the insurance companies with their widely scattered organizations.

We would very much appreciate any information available covering a policy of this nature.

D. W. Russell,
Vice-President & General Manager, Southwestern Transportation Co.

Claims Less Than Premiums

To date, the Santa Fe Transportation Company has carried public liability, property damage and collision insurance on the individual-coach basis, and, on some pieces of equipment, coverage running as high as $200,000 for any one accident. This method of handling insurance coverage was adopted as the most satisfactory during the first few years of the company's existence, at least pending a period sufficiently long to establish a record for safety on the roads over which we operate. Our experience indicates that the claims paid by our insurance company are a great deal less than premiums paid over a three year period, during which time approximately two and a half million miles were operated.

It might be to our advantage to carry an initial risk up to approximately $25,000 for any one accident, and obtain coverage in amounts over this sum with an independent insurance company; provided, of course, rates for such coverage would be sufficiently lower than full coverage, thus enabling us to carry the initial risk.

We are particularly interested in this subject and would appreciate any information available relative to various insurance companies' carrying risks in excess of a stated amount; for example, $10,000. In other words, are there any transportation companies now carrying their own risks up to $10,000 in any one year and carrying additional coverage over this amount?

R. H. Clarkson,
Santa Fe Transportation Company.

Replies to Question No. 8

Selecting and Training Drivers

"In hiring drivers, what qualifications should be considered essential? What examinations should be given, and what experience is desirable? What is the most effective way of training drivers to perform their duties efficiently and to observe the rules of safe driving? Should a merit and demerit system be used, hooking it up with a bonus system? If so, what system and amount of extra pay have been found most successful?"

This department has been established as a regular monthly feature of the *Motor Transport Section*, to provide a means for the exchange of information, based on experience, on every phase of motor coach and motor truck operation. It is strictly by and for the readers of the *Motor Transport Section*. If you have a question about any matter of motor coach operation or maintenance procedure, concerning which you would like to know what the experiences of others have been in handling the same problem, you are cordially invited to submit it for publication in this department. Your name will not be published with the question. In order that those who submit questions may have the benefit of as many viewpoints as possible in the answers to their questions, all readers of the *Motor Transport Section* are urged to give the benefit of their experience to our questioners and to others through replies to the questions published, when such questions strike at a matter which they have had to handle. We feel sure that our readers will be willing to co-operate whole-heartedly in replying to the questions published, because by this means knowledge of the best methods will be made generally available and the general efficiency of motor coach and motor truck operation in the United States will thereby be promoted. All questions and answers should be sent to the Editor, *Motor Transport Section*, *Railway Age*, 105 W. Adams Street, Chicago. The replies, which are selected for publication, will be paid for at the rate of from $2 to $5 per reply.

Has Driver Instructor

When hiring drivers, there are many things to be considered, among which the most important are experience, age, general appearance and demeanor, physical condition and past record. An applicant must of course, have had general experience in driving motor vehicles, whether small or large cars. We endeavor to secure men who have had passenger stage experience since this allows for a minimum of training and makes the man available for actual service in the shortest possible time. However, we do not make this an absolute

requirement, because our experience has shown us that it is possible to make first class passenger stage men out of drivers who have had only trucking experience. We do require that an applicant have experience with heavy equipment.

Our age limit for drivers is 21 to 40 years. General appearance and demeanor are, of course, age-old considerations by which all applicants for any position are judged by anyone experienced in the hiring of employees, and upon this I need not elaborate.

In the event an applicant is given an opportunity in our organization, the first thing on the program is a thorough physical examination and the filing of a personal record. It goes without saying that failure to pass the physical examination automatically rejects the applicant. Passing that, however, he then prepares a personal record, giving his history of employment for the five years previous. This qualifies him for temporary employment for 90 days, during which time the record is thoroughly investigated and, if satisfactorily verified, he is then considered a permanent employee.

Our examination of drivers at present consists of verbal questioning by the superintendent of transportation, a man of long experience in automotive transportation, and we have had no fixed method of training drivers other than to assign them to work with certain "old heads" and to secure from the latter reports of their progress.

However, we now have a new plan in effect. We have just established the position of "driver instructor," in which has been placed one of our former supervisors who has gone through the mill as a driver. He will conduct a school for new drivers for the purpose of training them in all requirements of their work and in addition will have authority to examine any driver on the system for his knowledge of the work. As a part of his work, he will take drivers out on the road with a stage and see that they qualify in driving ability. He will observe all drivers on actual schedules for their method of handling the public and will correct faults where they are found. His course of instruction will include everything which should be known by a first class passenger stage driver, and we feel that the results will show a tremendous benefit.

We have no definite system of discipline for infractions of rules and regulations. Our method has been to handle each individual case on its merits, taking all things into consideration and meting out whatever merit or punishment seems warranted. Of course, memoranda of meritorious service or rule violations are entered on the driver's personal record, which gives us a constant history of his work and forms the basis for promotion or severity of discipline, as the case may be.

R. W. LEMEN,
President, Oregon Stages.

Extra Pay for Good Work

In hiring drivers for the Northland Greyhound Lines, we consider age limit, education, past experience and physical fitness. Our examinations are equivalent to that which a first class engineer on the railroad is subjected, giving special attention to eyesight. Our age limit, therefore, must be restricted, as we feel that the average service life of a motor coach driver is comparatively short.

Our minimum age limit is 22 years, with a maximum of 28; height not less than 6 feet, and weight not less than 170 pounds. Drivers have the customary schooling of two or three weeks, at which time they are chaperoned through the shop under strict supervision and given an examination at the termination of this period. Under master drivers, they are given student trips for another period of weeks, and must pass an examination at the termination of this session. Eventually an examination on the Book of Rules, principally oral, is given.

I feel that a merit and demerit system is indeed beneficial if used in conjunction with a bonus system, for it represents a pay-in-advance proposition, demerits being issued which therefore represent a cut in bonus only, at the times when disciplinary measures are forthcoming. Such a record, closely kept, enables us to determine the men most fitted for advancement.

I likewise feel that a quarterly bonus is more beneficial than a monthly, for the reason that it gives drivers an opportunity to get on their feet again, should they start off badly because of weather conditions or any other operating hazard. The amount of extra pay may vary, but on an average it should give the driver about $10 a month additional. Excessive bonus checks detract materially from the general performance of many drivers.

R. W. BUDD,
Vice-President & General Manager, Northland Greyhound Lines.

Replies to Question No. 9

Planning A Motor Coach Garage

"We would like to have some pointers from more experienced operators of motor coaches as to what we should look out for in building a garage to house and maintain (both running and heavy repairs) about thirty motor coaches. What equipment should be provided for the inspection and overhaul of the rolling stock? What provision should be made for heating and ventilation? Is there any generally accepted practice as to the location of gassing, washing, inspection, repair and storage space?"

A Model Garage

Not being familiar with the particular company calling for an answer to this question, it is quite difficult to answer intelligently. One should know what are the prospects of the company's expanding its operations and the number of motor coaches that this company will operate in the future. Assuming that this particular operator is a progressive one, and with the view that the operation may expand, I will try to give you my views on building a garage.

First, I would start with a 100 ft. width, clear span, which would eliminate obstructions such as posts or columns, starting the garage at the front property line and building it sufficiently large to take care of present requirements, leaving the back portion of the lot for parking in favorable weather and for repairs that can be done outside when weather permits. This would enable the operator to extend his garage to the back property line whenever he desired to do so. As to the size of a garage to take care of 30 motor coaches, with the idea of having paint shop facilities, small wood working machinery and three pits, I would start with a building of 100 ft. by 150 ft.

The height of the garage should be 14 ft. from the

floor to the girders, which would allow for sufficient air circulation, and there should be three ducts installed in the roof, to be open all year round, which would provide sufficient ventilation. As to the location of the wash rack and gasoline pump, I believe that the logical place for a gas rack and wash rack in the garage is just about a coach length from the entrance door, which would enable coaches to be gassed as they came in, and the wash rack should be located in the center of the garage.

I would arrange to have pits at the back part of the garage, the pits to be arranged so that they could be covered with 3 in. by 10 in. oak boards when not in use in order to eliminate loss of space. Coaches could be parked over the pits when they were not in use. With a garage 100 ft. wide, coaches can be backed in along each side, and any coach can be pulled out at any time until it is necessary to store coaches in the center aisle. This practice provides a very nice appearing and convenient arrangement.

As to equipment for maintaining coaches, inspection and general overhaul, I believe the following should be provided. There should be ample heavy tools, such as floor jacks, brake lining machine, arbor press, electric drills, large pedestal grinder, soldering iron furnace, bench type welding output complete, a good reliable battery charger, air compressor, small lathe and medium sized drill press. An electric test bench of late design is also a big asset to the proper maintenance of electrical equipment. One service car for road calls should also be provided. These are the most essential pieces of equipment necessary to carry out a complete inspection and overhaul. There are numerous other pieces of equipment that I might mention which are more costly and might not justify purchase by the operator of a fleet of this size.

H. P. McDONALD,
Superintendent of Automotive Equipment, Missouri Pacific Transportation Company.

Essential Garage Equipment

Maintenance equipment should not be indulged in too extensively until experience shows just what is needed most and what type will handle the majority of the operator's equipment. A lathe is very handy, but not absolutely necessary. Drill presses, large and small, will be found very useful. Portable breast drills, large and small, are indispensable, as is, of course, a well stocked drill rack, which must be kept complete at all times. There should be a battery charger of the constant potential type, with plenty of tools and equipment to completely maintain batteries; and an electric test bench with accessories to service the operator's particular type of units.

A forge and acetylene welding apparatus are very necessary, as is a welding table; and in order to obtain maximum results, this equipment should be handled by an expert. Aligning jigs, micrometers, gages, and all precision tools, if properly used, will serve to turn out better work and will be an investment well worth while. A tube and tire department, not too elaborate, for quick repairs, is worth considering. Radiator tanks and accessories; a radiator flushing device, which will cure many heating evils in warm weather; a large capacity air compressor, insuring plenty of air for the shop and cleaning coach interiors; hydraulic jacks, both wheel and stationary; chain hoists; motor stands; valve refacing tools; reamers up to 1½ in., should all be available in a well-equipped shop.

The fact cannot be stressed too strongly that special tools effect a time and money saving. No expense should be spared to equip the shop with special hand tools as supplied by the manufacturers of the respective cars or coaches.

Painting must be taken care of, and in this respect our method of handling is as follows: Fenders, wheels, scratches, etc., are taken care of in a department adjacent to the storage room. Complete repaint jobs are sent to another building, where wheels, lamps, etc., can be removed, and where the job will not be rushed.

Inspection pits are in the main building with a part of the storage department. This facilitates fast handling, inasmuch as the coaches are run directly out of stalls over the pits. A well-lighted wash rack and high-pressure washing machines are found to be most necessary, with vacuum cleaners and compressed air available if interiors are to be taken care of on the rack.

Our heating and ventilating situation is well taken care of with a hot air fan and duct system which changes the air in the building every nine minutes. This is one of the things which, owing to the presence of monoxide gas in large quantities in a garage of this kind, cannot be gone into too carefully.

Fueling of equipment should be taken care of where coaches will offer the least obstruction, this depending on the floor plan of the building.

FRANK J. HORN,
Assistant Superintendent, Santa Fe Transportation Company.

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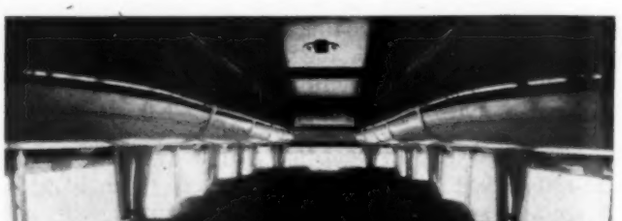
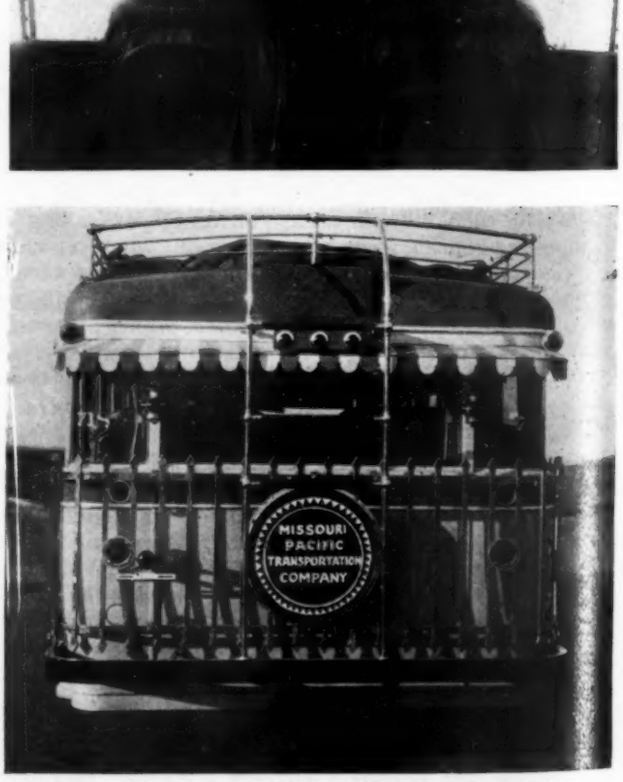
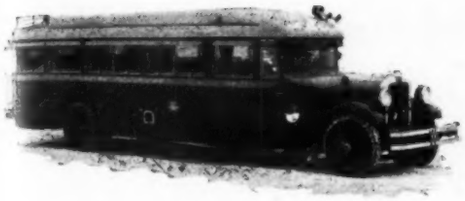




Interior and Rear Views of White Coach with Lang All-Metal Body



NEWS *of the* MONTH

Railways Open Chicago - Denver Service

Union Pacific and Chicago & North Western participating—Interstate Transit Lines, U. P. subsidiary, is operating company—Two trips each way daily provided

Through motor coach service between Chicago and Denver, Colo. via Omaha, Neb., has been established by the Union Pacific and the Chicago & North Western. This service, which is the first step taken by the railways in this territory to compete for long-distance passenger business with independent trancontinental motor coach lines, will be provided through the agency of the Interstate Transit Lines, motor coach operating subsidiary of the Union Pacific.

It has been understood for some time that the Union Pacific planned the early inauguration of transcontinental motor coach service between the middle-west and the Pacific coast. With a line already in operation between Chicago and Denver and with control of a number of lines southwest and northwest of Salt Lake City, Utah, it has already accomplished a substantial part of its aim. Indications are that the Union Pacific plans also to extend its motor coach service from Kansas City to St. Louis, Mo., giving it another transcontinental route from St Louis westward. The Chicago & North Western's interest in the Chicago-Denver service extends only as far as Omaha, Neb. Its agents will sell tickets good for transportation in the motor coaches of the Interstate Transit Lines and the company presumably will participate in the earnings of the motor coach operation.

Two schedules in each direction daily will be operated by the Interstate Transit Lines between Chicago and Denver. Westbound, the motor coaches will leave Chicago at 8:30 A. M., and 8:30 P. M. Eastbound coaches will arrive in Chicago at 7 A. M., and 6:10 P. M. A new motor coach station has been established by the company at 163 North Clark street in Chicago, providing a centrally located point at which passengers may purchase tickets and board the motor coaches.

The motor coaches to be used on this line will be part of those secured by the Interstate Transit Lines through large orders it has placed recently. They are painted blue, with cream trimming, and have reclining chairs for 25 passengers. The coaches are equipped with Westinghouse air brakes and in every respect are said to represent the most luxurious motor coach equipment obtainable.

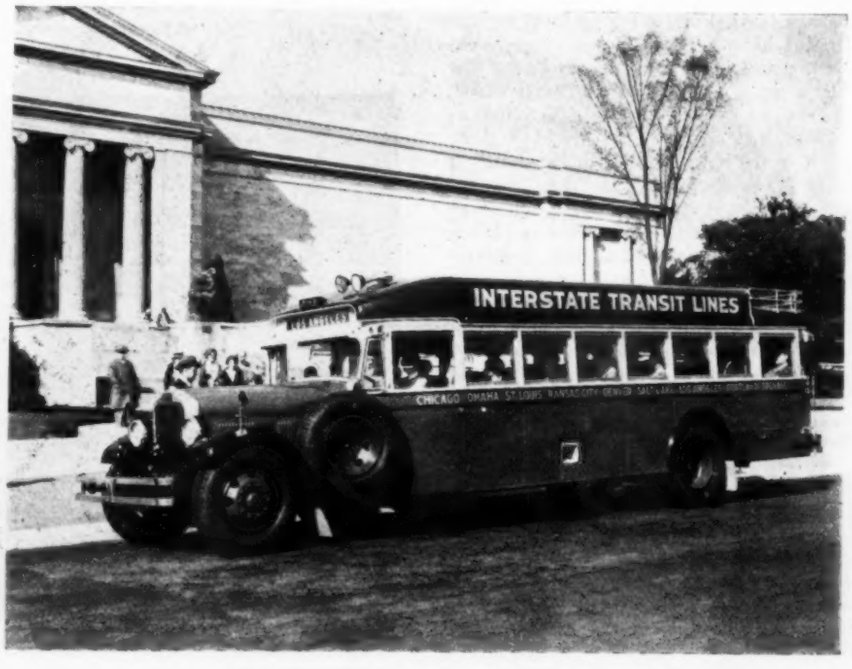
"At first thought, it might be assumed that we are competing against ourselves by thus paralleling our own track with a de luxe motor coach service, but that is by no means the case," a North Western officer is reported to have said. We are losing no rail traffic by installing these motor coaches. On the other hand, we feel sure that the motor coaches will bring business to the railway. We anticipate that they will act as feeders to our trains. They will be able to cover various inland villages close to our tracks, picking up passengers who may desire to travel for their entire journey by motor coach, or who may desire to transfer to a train at some convenient railroad station."

At present, the motor coach line is handling interstate passengers only, but the Interstate Transit Company applied to the Iowa Railway Commission on October 17 for a permit to handle intrastate passengers in Iowa on the through motor coaches.

From several other points have come reports of the progress being made by the Interstate Transit Lines in the establishment of new motor coach services. In Kansas, the company is proposing to establish a motor coach line parallel to the railway line between Kansas City, Mo., and Denver. The Colorado Public Utilities Commission granted to the Interstate Transit Lines permission to operate motor coaches between Denver and the Colorado-Wyoming state line. In Kansas City the company leased a building with 15,000 square feet of ground floor space which will be used as a garage and for the servicing of the Union

Merger of California Highway Freight Lines

The American Engineering & Management Company is consolidating several highway freight lines in southern California, according to a recent statement of Louis Davis, Jr., chairman. The motor truck operators involved in the proposed combine were reported to be earning annual gross revenues of approximately $2,000,000 and to have a combined property value of $3,500,000.



White Model 54 Operated in the Chicago-Denver Service

Pacific motor coaches entering Kansas City. The Missouri Public Service Commission held a hearing on October 10 on the application of the Interstate Transit Lines for permission to operate motor coaches in both interstate and intrastate service over federal highway No. 40 between St. Louis, Mo., and Kansas City.

Long Runs Feature Operations of U. P. Stages

The latest timetable of the Union Pacific Stages, dated October 10, lists 19 motor coach schedules with the more important routes operating out of Portland, Ore., to Salt Lake City, Utah, and Spokane, Wash., and out of Salt Lake City to Yellowstone National Park.

The run between Portland and Salt Lake City is the longest, covering 960 miles. Two through coaches are scheduled out of Portland and Salt Lake City each day. The Portland-Salt Lake City coaches leave the former at 7:10 a. m. and 10:30 p. m. and arrive at Salt Lake City respectively at 11:25 p. m. the following night and at 3:30 p. m. the second day. In the course of the run the coaches serve 135 communities, according to the timetable listing. In the opposite direction through coaches leave Salt Lake City at 7:30 a. m. and 6:30 p. m. The 7:30 a. m. coach out of Salt Lake City makes overnight stops at Boise, Idaho, and Pendleton, Ore. It arrives at Boise at 12:25 a. m. the second day out and leaves there at 7:00 a. m., stopping at Pendleton from 4:30 p. m. that night until 8:45 a. m. on the morning of the third day. This coach arrives in Portland at 5:45 p. m. of the third day. The 6:30 p. m. coach makes the run without overnight stops and arrives in Portland at 7:00 a. m. of the second day.

On the Portland-Spokane run, which covers 376 miles, two daily round trips are operated in each direction. Motor coaches leave Portland at 7:10 a. m. and 10:30 p. m., while departures from Spokane are at 8:00 a. m. and 5:30 p. m. The 7:10 a. m. coach out of Portland makes the run in 14 hrs. 45 min., arriving in Spokane at 9:55 p. m. and the 10:30 p. m. coach in 14 hrs., arriving in Spokane at 12:30 p. m. the following day. In the opposite direction, the 8:00 a. m. coach out of Spokane makes the run in 14 hrs. 30 min., and the 5:30 p. m. coach in 13 hrs. 30 min.

Coaches between Salt Lake City and Yellowstone National Park make one daily trip in each direction over this 358-mile route. The 7:00 a. m. coach out of Salt Lake City arrives in West Yellowstone, Mont., at 10:15 p. m., thus making the run in 15 hrs. 15 min. The 8:00 a. m. coach out of West Yellowstone makes the run in 15 hrs. 20 min., arriving in Salt Lake City at 11:20 p. m.

Other long runs listed include a connecting schedule from Portland, via Pendleton and Walla Walla to Spokane, 444 miles; another from Spokane through Boise to Salt Lake City, 466 miles; a third between Yakima, Wash., and Spokane, 253 miles; and one between Yakima and Lewiston, Idaho, 246 miles.

New England Motor Coaches Now Serve 325 Communities

The extent of the highway motor coach services now operated by the New England Transportation Company, New York, New Haven & Hartford subsidiary, may be learned from the latest edition of its complete timetable, dated September 29. In this folder the index to points served lists 325 different communities, 319 of which are in the states of Massachusetts, Connecticut, Rhode Island and New York—the territory served directly by the New England and affiliated companies. The remaining six points of the total 325 are those for which New England coaches make connections. They are: Augusta, Ga.; Baltimore, Md.; Jacksonville, Fla.; Philadelphia, Pa.; Richmond, Va.; and Washington, D. C.

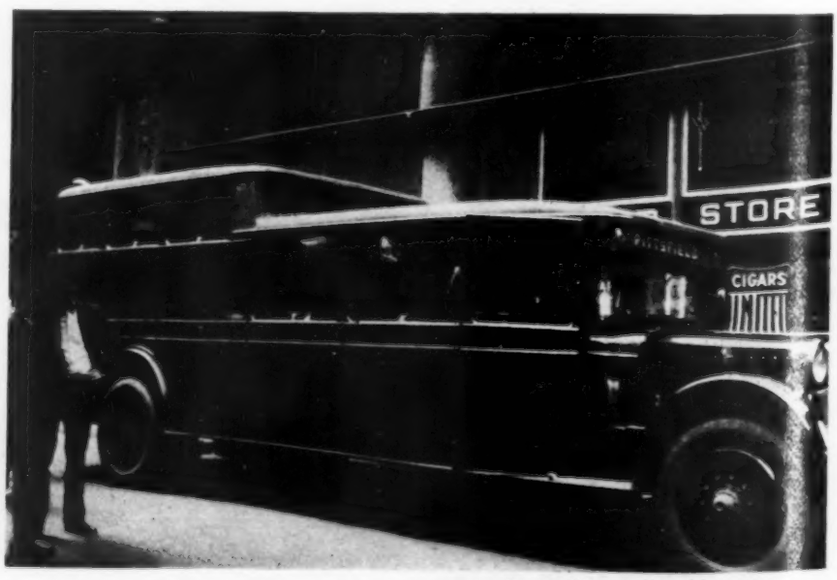
The timetable lists five motor coach lines which are affiliated with the New England. These are: The Interstate Limited Motor Coach Company, operating between Providence, R. I., and Fall River, Mass.; the Union Street Railway, which operates between Providence and New Bedford, Mass.; the Newport & Providence Railway Company, operating between Providence and Newport, R. I.; and the Interstate Street Railway, which operates between Providence and Plainville, Mass., and between Providence and Attleboro, Mass.

Connecticut leads the other states in the number of its communities served, with 152 listed in the timetable. Massachusetts is second, with 122, while 35 communities in Rhode Island and 10 in New York are listed. Several of these communities are served by alternate routes, but have nevertheless been counted but once in this review.

On the cover of the timetable the New England holds itself out to render "Safe and dependable highway service coordinated with the New York, New Haven & Hartford Railroad and the New England Steamship Company." It lists 48 principal motor coach terminals at 34 of the points served. Twenty-four of the 48 terminals are railroad stations. Motor coach tickets may be purchased at any New Haven station served by the coaches, at the designated motor coach terminals and various stopping points.

The map in the timetable reveals graphically how completely the New England lines serve southern New England, extending from Provincetown at the end of Cape Cod and Boston, both via the shore line and interior routes to New York. In central and western Massachusetts, Worcester, Fitchburg, Springfield, Northampton and Pittsfield are served.

The longest through run listed is that between Boston and New York. Five daily round trips are made between these two cities. Coaches for New York leave Boston at 8:00 a.m., 9:00 a.m., 1:00 p.m., 9:00 p.m., and 10:00 p.m. The 8:00 a.m. coach follows the route via Hartford, Conn., and is scheduled to make the run to New York in 11 hours. The 9:00 a.m. coach goes via the shore route and also makes the run in 11 hours. The 1:00 p.m. and 9:00 p.m. coaches follow interior routes while the 10:00 p.m. coach follows the shore route. This latter makes the run in 10 hours, arriving in New York at 8:00 a.m. Boston coaches out of New York are similarly routed with schedules calling for departure at 9:00 a.m., 10:00 a.m., 1:00 p. m., 10:00 p.m., and 12 midnight. At New York the coaches serve the Waldorf-Astoria and the Pennsylvania motor coach terminals. The next longest run is between New York and Springfield, Mass., 142 miles, with three daily round trips scheduled.



A New York-Pittsfield, Mass., Coach of the New England at Waldorf-Astoria Terminal, New York

More Railways Report on Their Motor Transport Activities

Since the publication in the *Motor Transport Section* of September 28, page 758-762, of the tabulation of the motor coach and motor truck services of the Class I steam roads, official information regarding motor coach and truck activities from four additional railways has been received.

The Pennsylvania reports that the People's Rapid Transit Company, in which it has a 75 per cent interest, operates 80 motor coaches over 328 miles of routes. On an annual basis, this company operates 3,020,202 motor coach miles, carrying 698,282 passengers, passenger miles annually being 2,884,692. Through the Philadelphia Suburban Transit Company, in which the Pennsylvania also has a 75 per cent interest, it is operating 7 motor coaches over 10 miles of route, operating 464,382 motor coach miles annually, and carrying 1,100,413 passengers. With respect to its motor truck service, the Pennsylvania, through contractors and subsidiary companies, is operating 68 motor trucks, 4 tractors and 29 trailers and semi-trailers in line service, and 539 motor trucks, 162 tractors and 938 trailers and semi-trailers in terminal service.

The Chesapeake & Ohio, through the Southland Transportation Company, is operating 4 motor coaches for the transportation of employees between Covington, Ky., and Stevens, a distance of 9 miles. These motor coaches are operating 189,000 miles annually, carrying 334,908 passengers. The operating cost per mile is 34 cents, and the number of passenger train miles replaced on an annual basis is 96,360. Through a contract with the Cincinnati Motor Terminals Company, it is using a portion of the time of two motor trucks for the transportation of l.c.l freight between Cincinnati, O., Covington, Ky., and Newport.

The Central of New Jersey, through the Jersey Central Transportation Company, a subsidiary, operates two motor coaches over 26 miles of routes, accumulating 6,341 motor coach miles annually, and carrying 34,688 passengers. The operating cost per mile is 23.36 cents, and the number of passenger train miles replaced on an annual basis is 41,665. Under a contract with the Public Service Interstate Transportation Company, one motor coach is operated over a 36-mile line, accumulating 52,196 motor coach miles annually, and carrying 16,980 passengers. The operating cost of this motor coach is 34.96 cents per mile. Its operation has enabled the replacement of 41,577 passenger train miles annually. Two motor truck operations are carried on by the subsidiary, the Jersey Central Transportation Company. One motor truck operating over a 21-mile route, replaces 41 freight train miles daily, carries a daily average of 7.78 tons of freight, making approximately 300 ton miles daily. Another truck, operating over a 36-mile route, handles the transfer of express, mail and baggage in connection with the operation of the motor coach by the Public Service Interstate Transportation Company.

Through its subsidiary, the West Virginia Transportation Company, the Baltimore & Ohio is operating 26 motor coaches over 350 miles of routes, and accumulating 1,100,000 motor coach miles annually.

The reported operating cost or 22.5 cents per mile includes interest, depreciation, taxes, licenses, insurance and all operating expenses. Through the operation of its motor coaches in West Virginia, the Baltimore & Ohio has been able to replace 45,000 passenger train miles annually. The Baltimore & Ohio also has an extensive train connection motor coach service between Jersey City, New York and Brooklyn. Its motor truck services are also extensive, but the company reports that there has been no change in these since last year, when they were reported in a similar survey.

B. & M. Inaugurates Line Over Mohawk Trail

The Boston & Maine Transportation Company, highway subsidiary of the Boston & Maine, has inaugurated motor coach service over the Mohawk Trail between Boston, Mass., and Albany, N. Y. At Albany connections are made with motor coaches for Utica, Rochester and Buffalo, N. Y., Detroit, Cleveland, Chicago and Pacific coast points.

The Boston & Maine motor coaches leave the Park Square terminal, Boston, at 7:50 a.m. each day and arrive in Albany at 4:40 p.m. The line also serves Lexington, Concord, Fitchburg, Winchendon, Athol, Orange, Greenfield, North Adams, Williamstown, Troy and smaller intermediate points.

C. B. & Q. Plans Chicago-Burlington Line

Motor coach service between Chicago and Burlington, Ia., is planned by the Chicago, Burlington & Quincy, according to a recent announcement. The schedule will call for express service between Chicago and Aurora, Ill., but from the latter point to Burlington local stops will be made in both directions.

Motor Coach Travel on Pacific Coast

More than 5,000,000 motor coach travelers enter or leave Los Angeles annually by Pickwick, Yelloway, California Transit, Southern Pacific Motor Transport and other highway lines, according to figures recently released by the foregoing companies. The compilation shows that the Los Angeles traffic is more than double that of the second largest motor coach center in the west—San Jose, where the number of passengers totals 2,000,000 annually.

Motor coach travel inbound and out from San Francisco also totals in the neighborhood of 2,000,000 passengers annually, the survey further reveals. Travel in and out of San Diego, Portland and Seattle is approximately the same as that at San Francisco, thus making a total of approximately 15,000,000 motor coach travelers annually on the major highway lines in and out of the seven larger Pacific coast cities.

White Model 65, Operated by Utah Parks Company, Union Pacific Subsidiary

Charges Illegal Transportation of Mail in Motor Coaches

The alleged violation of national postal laws by certain motor coach lines in Texas is being investigated by a post office inspector in that state. It is charged that the motor coach companies are carrying and receiving remuneration for the transportation of first class mail in competition with the regular postal service of the government.

The inspector said that charges had been made that two motor coach lines in the Rio Grande Valley have been maintaining a regular independent mail service, charging 25 cents and 50 cents a piece for delivering mail. The investigation showed, he said, that one of the companies accepted mail and delivered it to the addressees, while the other merely carried such mail to its headquarters in the towns to which such letters were addressed and telephoned the addressees to call for the mail.

"All matter that might be considered as first class mail in a post office can be legally transported from one place to another only through the properly constituted postal authorities," the inspector said. "Our investigations in the Rio Grande Valley disclose that many salesmen are sending in orders to their headquarters by these motor coach lines, and several large business houses in that section have availed themselves regularly of this service, thereby depriving the government of revenue."

The inspector announced that he would seek to recover for the government large sums believed to have been collected by the motor coach lines.

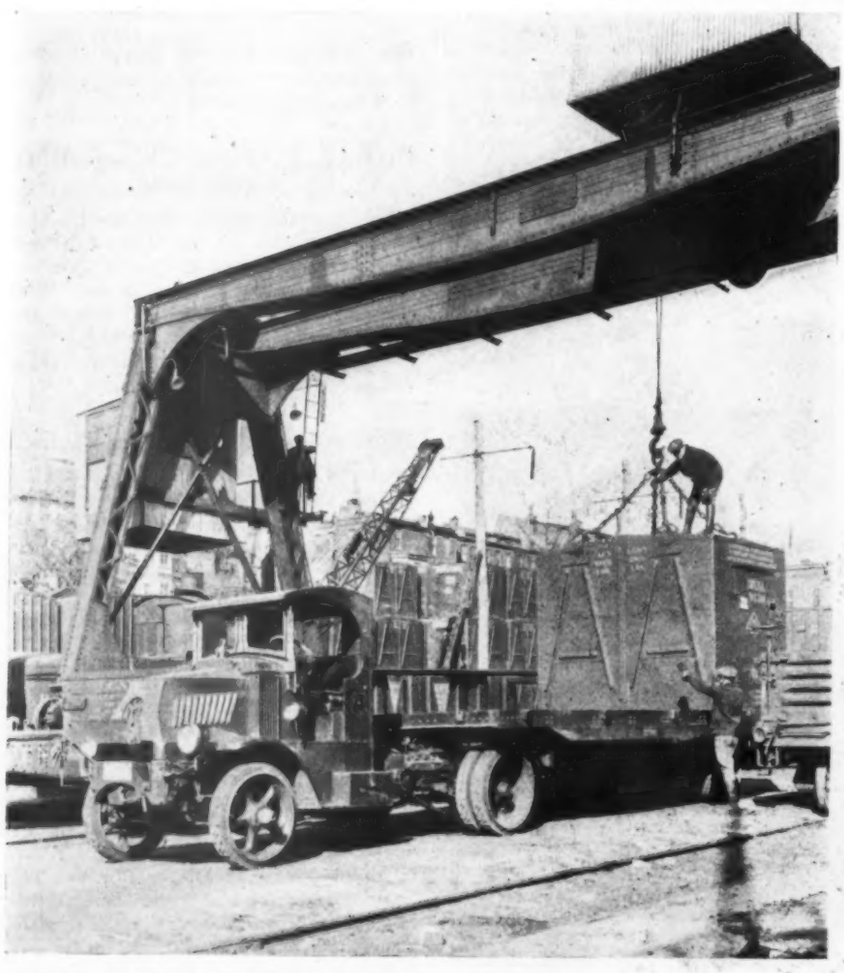
Drivers' Tactics Criticized

The National Association of Motor Bus Operators, successor to the National Bus Division, American Automobile Association, in a recent bulletin, calls the attention of its members to complaints and critical editorials which are now current regarding "the speed at which motor coaches are operated over the highways and the tendency of motor coach drivers to hog the road and not give way to other traffic."

These complaints and editorials, the bulletin points out, are having their effect and in many states are leading to emphatic action on the part of regulatory officials, municipal and county authorities. While conceding that "conditions are bad," the survey nevertheless points out that "a good many of the complaints voiced are due to the fact that there is no interstate regulation to curb the activities of many irresponsible individuals and companies who, under such a law, would be disqualified." Despite this latter indictment, however, the observation follows that "a large number of them (complaints) are directed against operators who we have every reason to believe are responsible and should, by the extent of their operating interests, do everything possible to eliminate public dissatisfaction."

An editorial which appeared in the Washington, D. C. Star is quoted. It concludes with: "No automobile is safe on the highway when bus drivers violate the rules of the road. The law should be applied with special strictness to busses, on account of their gigantic size and the high speed at which they travel." This editorial, the bulletin continues, is typical of opinion in a good many states. Newspapers are found to be particularly critical of the practice of laying out motor coach schedules which, to be met, necessitate the violation of speed laws.

"Undoubtedly, the passage of an interstate law," the survey concludes, "would have the effect of improving conditions." The adoption of a code of ethics is suggested tentatively and a general discussion of the subject will be held at the next meeting of the National Association of Motor Bus Operators' board of directors.



Loading Merchandise Freight Containers onto Fruehauf Heavy-Duty Semi-Trailer, Hauled by Mack Tractor

D. & R. G. W. Royal Gorge Route

The Denver & Rio Grande Western has been granted permission by the city council of Canon City, Colo., to operate motor coaches to the rim of the Royal Gorge.

Florida Commission Granting Permits

The State Railroad Commission of Florida met in Jacksonville on October 10 to receive applications from motor vehicle operators for operating certificates as required by the new law. This law places motor coach and truck lines of the state under the Commission's jurisdiction, and as three months have elapsed since its passage, all operators are now required to have registered.

Automotive Engineers' Transportation Meeting

The Society of Automotive Engineers will hold its 1929 transportation meeting at the Royal York Hotel, Toronto, Canada, from November 12 to 15. This session overlaps the November meeting of the Motor Transport Division which is also to be held in Toronto. It has therefore been arranged to hold, on November 13, a joint session of the two organizations.

Papers to be presented at the meeting of the Society of Automotive Engineers will consider design, use, operation and maintenance of motor coaches and motor trucks.

D. & R. G. W. Seeks Permit

The Rio Grande Motor Way of Utah, motor coach operating subsidiary of the Denver & Rio Grande Western, has applied to the Utah Public Utilities Commission for permission to operate a motor coach service between Salt Lake City and Nephi.

Celebrate Opening of New M. P. Line

The inauguration of motor coach service between Houston, Tex., and Freeport by the Missouri Pacific Transportation Company, motor coach operating subsidiary of the Missouri Pacific System, was celebrated by a number of leading business men of Houston, who attended a luncheon in that city on October 10 as guests of H. R. Stafford, vice-president of the Missouri Pacific. The new line is 63 miles long.

Burlington Proposes New Motor Coach Lines

The Burlington Transportation Company, motor coach operating subsidiary of the Chicago, Burlington & Quincy, is proceeding with its plans for the extension of its motor coach services. It has applied to the Iowa Railroad Commission for authority to operate two lines in Iowa, additional to its present line between Clarinda and Council Bluffs.

On September 25, the commission considered the application of the Burlington Transportation Company for authority to establish a motor coach service between Glenwood, Balfour, Malvern, Emmerson, Red Oak, Stanton, and Villisca. The transportation company has also applied for authority to operate motor coaches between St. Joseph, Mo., and Omaha, Neb., via Council Bluffs.

Contest Routes in Southern Utah

The proposal of the Utah Parks Company, motor coach operating subsidiary of the Los Angeles & Salt Lake, to operate several motor coach routes in southern Utah is being contested by independent motor coach lines and also by the motor coach subsidiary of another railway. At a hearing before the Utah Public Utilities Commission, counsel for the Utah Parks Company contended that the railway should receive the motor coach operating certificate in order that it may co-ordinate more fully its railway and highway operations. It was announced that the company had purchased the union motor coach station at Salt Lake City.

Representatives of the Rio Grande Motor Way of Utah, a subsidiary of the Denver & Rio Grande Western, together with representatives of independent companies, opposed the application on the grounds that the interchange of motor coach and railway passengers could be accomplished at only a few points, and that the inauguration of the service by the Utah Parks Company would seriously threaten the continuation of the existing motor coach routes.

Independent Lines Alarmed by Railway Proposals of Motor Coach Operation

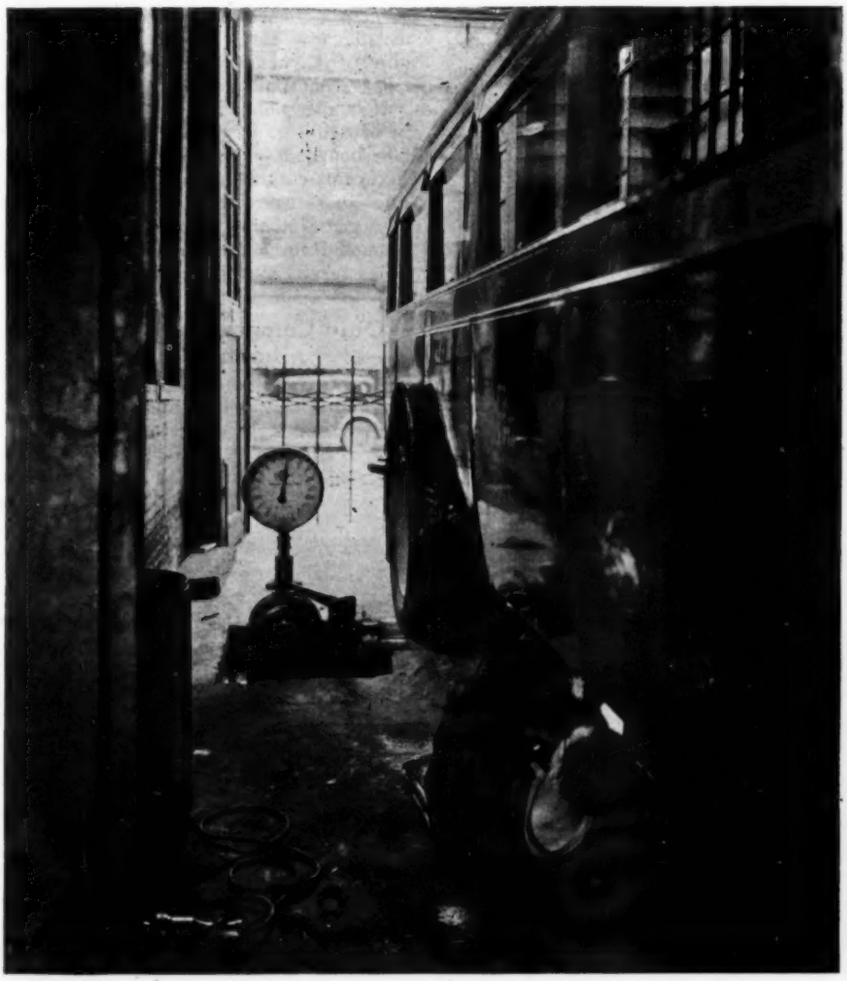
Reports from Missouri and Kansas indicate that the independent motor coach lines in those states are thoroughly aroused and are strenuously opposing applications of steam railways for certificates to permit them to operate their own motor coaches parallel to their railway lines in those states.

A large number of interested railways, including the Missouri Pacific, Union Pacific and the Chicago, Burlington & Quincy, have made strong representations to the state commissions for authority to co-ordinate motor coach service with their train service. The independent lines have been doing business for several years and now hold operating certificates covering virtually all of the routes over which the railways propose to inaugurate services.

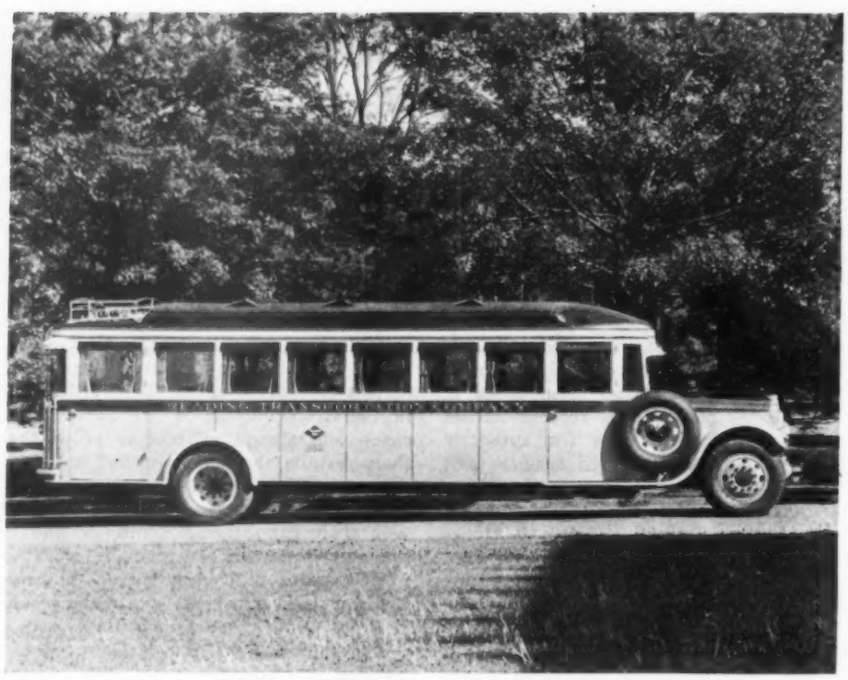
Independent motor coach operators have appealed to the commissions on the grounds that they have pioneered in motor coach transportation and that they should be protected. The view of the railroads, on the other hand, is that they are primarily in the transportation business and that they are entitled to adopt every modern means of transportation to improve the service they render to their patrons.

"Missouri, like Kansas, is faced with the problem of pacifying the railroads, the state's heaviest taxpayers," says a special writer in a Kansas City newspaper. "Officials of railroads operating in Missouri often appear before the public service commission to plead their cases, and always attempt to prove that their permits should be granted ahead of those of independently owned companies. In several instances the railways have won their cases, but not always, and in the state today there are many privately owned motor coach lines using the state highways which parallel the tracks of the railways serving the same cities."

The members of the Missouri Public Service Commission, says this writer, admit that they are up against a problem that becomes more complex each each month.



Brake Testing Machine at Philadelphia Garage of Greyhound and P. R. T. Affiliated Lines of the Pennsylvania



Mack Model BK in Service of Reading Transportation Company

To Construct 100-Passenger Motor Coach

According to press reports from Grinnell, Ia., the Eggleston Compartment Coach Manufacturing Company of that city will construct motor coaches capable of transporting 100 passengers. The coaches are to be constructed on a tractor and trailer plan, and will be equipped with 6, 8 or 10 wheels.

Alton Starts New Line

The Alton Transportation Company, motor coach operating subsidiary of the Chicago & Alton, on September 25 began the operation of motor coaches between Louisiana, Mo., and Mexico. Two motor coaches are being operated each way daily over this 60-mile route, on a 2 hr. 15 min. schedule. Stops are made at Laddonia, Farber Junction, Vandalia, Curryville, Bowling Green and Vera. The motor coaches have replaced local passenger trains, and the fare charged for transportation in the motor coaches is $1.85 for the trip between Louisiana and Mexico, this being the same as the railway fare between these points.

Co-ordinated Rail and Highway Service in France

Under the leadership of the French State Railways the co-ordination of rail and highway services is proceeding rapidly, particularly in the northern part of France. In addition to sight-seeing trips which the railways have operated for some time in Brittany and Normandy, motor coaches are now being used to substitute for local passenger trains on unprofitable branch lines, to connect the railways with the smaller off-line summer resorts and to provide direct cross-country service between towns located on lines radiating from Paris but having no rail connection with each other. By next summer it is expected that joint rail and motor coach tickets will be on sale at unusually low rates, particularly with the object of encouraging week-end excursions from Paris.

It is also planned to try the experiment of bringing trans-atlantic passengers from Cherbourg direct to their Paris hotels in luxurious cars which will stop en route to allow passengers to do some sight-seeing. If successful, this plan will eventually be extended to Havre and other channel ports served by the State Railways.

Ohio Commission Cites Greyhound Lines

The Greyhound Lines, part of the largest motor coach operating system in the United States, in which the Pennsylvania has a substantial interest, was cited by the Ohio Public Utilities Commission to appear before it on October 17 and show cause why its four Ohio certificates should not be revoked for alleged violation of the commission's regulations.

Thirty three instances of violation to regulations were charged in the citation. The commission alleges that drivers of the Greyhound motor coaches have exceeded speed limits and have failed to bring the coaches to full stops at railroad crossings.

The Greyhound Lines operate motor coaches over four routes in and through Ohio.

Highway Competition's Influence on British Rail Fares Discussed

The influence of highway competition on railway passenger rates in Great Britain is discussed in detail in an article appearing in a recent issue of Modern Transport (London). The writer points out that the intensity of competition for passenger traffic between railways and motor coach companies has appreciably reduced the cost of travel in Great Britain. He continues to say, however, that the process of drafting agreements between motor coach operators and the railways is now nearly complete. In view, therefore, of this latter trend, it is held to be unlikely that cheap rates which have been a feature of recent years will remain in effect since many existing railway fares are barely remunerative.

Statistics accompanying the discussion reveal that since 1923 the railways have been converting their short and medium-distance full-fare traffic into reduced rate traffic in order to hold it. In 1923 a total of 417,000,000 passengers, or 31.6 per cent of the total, traveled at full fare; in 1928 the full-fare passengers fell to 200,000,000 or 17.1 per cent. At the same time the number of excursion passengers rose from 123,000,000 or 9.3 per cent of the total to 320,000,000 or 27.3 per cent.

The railway agreements with the motor coach companies, the article continues, should make it possible gradually to change this present cheap fare policy on routes where there are agreements, and benefit both railways and roads by establishing a higher level of fares and limiting the train mileage and motor coach mileage on particular routes, thus increasing both the receipts per passenger mile, the passenger miles per train mile and the passenger miles per motor coach mile.

The article next surveys the past year's agreements between British railways and motor coach companies. These have been reported from time to time in the *Motor Transport Section*. Finally the prediction is made that "A complete railway control of road passenger traffic may be safely foreshadowed as a certainty within the next year or two after the provisions of the Draft Road Traffic Bill have become law." This bill which is soon expected to pass Parliament requires, among other things, that public service vehicles be licensed only when they do not duplicate existing services.

Pickwick Earnings Exceed 1928 Total

Earnings of the Pickwick Corporation and its subsidiaries for the current year will exceed those for 1928 by a substantial margin according to a recent announcement by Charles F. Wren, president. According to the statement the dividend requirements on the common stock, amounting to 80 cents a share, were earned during the first seven months of 1929, whereas, during the entire year 1928 earnings available for common dividends amounted to 88 cents a share.

Dividends for the final 1929 quarter were recently declared on all classes of securities.

Notice of Motor Transport Division Meeting

A call has been issued by A. P. Russell, Chairman of the Motor Transport Division, American Railway Association, for the second annual meeting to be held at the Royal York hotel, Toronto, On-

tario, from November 12 to 15, inclusive. The first day's session will convene at 10:00 a.m., and will be devoted to consideration of the reports of the General Committee, the Nominating Committee and the Motor Truck section. A joint conference with representatives of the automotive industry has been arranged for the following day, while November 14 will be devoted to reports of the Rail Motor Car section. Reports of the Law Committee and of the Motor Coach section will be discussed at the closing sessions on November 15.

Orders for Equipment

THE NEW ENGLAND TRANSPORTATION COMPANY has accepted delivery of eight five-ton Autocar chassis.

THE INTERSTATE TRANSIT LINES, motor coach operating subsidiary of the Union Pacific, has accepted delivery of five Type W city service Yellow coaches from the General Motors Truck Company, Pontiac, Mich.

Motor Transport Officers

Earl Hensley has been appointed general insurance agent of the Pacific Transportation Securities, Inc., with headquarters at San Francisco, Cal.

A. A. Camail has been appointed general baggage and express agent of the Pacific Transportation Securities, Inc., with headquarters at San Francisco, Cal.

J. B. Baker, division passenger agent of the Chicago, Burlington & Quincy, at St. Joseph, Mo., has been appointed general passenger agent of the Burlington Transportation Company, the motor coach operating subsidiary of the Burlington, with headquarters at Chicago.

J. W. Krug has been appointed superintendent of operation of the Union Auto Transportation Company, with headquarters at El Paso, Tex., succeeding **C. R. Gindra,** resigned. Mr. Krug will have jurisdiction over territory from Douglas, Ariz., to El Paso, Tex., and from Safford, Ariz., to El Paso.

Frank McMahon has been appointed acting superintendent of operation of the Valley division of the California Transit Company, with headquarters at Los Angeles, Cal., succeeding J. H. Hodge. His jurisdiction covers territory from Los Angeles to Bishop, Cal.; Los Angeles to Fresno and all local lines operating in and around Fresno.

The jurisdiction of **L. D. Jones,** assistant to the president of the Pickwick Stages System and the Union Auto Transportation Company and regional manager of the California Transit Company and the Southern Pacific Motor Transport Company includes the following territory; Los Angeles to and including San Luis Obispo, Tex.; Los Angeles to, but not including, Fresno; Los Angeles to Bishop and Los Angeles to and including El Paso, Tex.

J. H. Hodge has been appointed acting regional manager of the Southern Pacific Motor Transport, the California Parlor Car Tours, the California Transit and the Pickwick Stages, with headquarters at San Francisco, Cal., succeeding E. J. Thompson. Mr. Hodge will have jurisdiction over the territory from San Francisco to and including Fresno, Cal.; San Francisco to, but not including, San Luis Obispo, Cal.; San Francisco to Salt Lake City, Utah; San Francisco to, but not including Medford, Ore. via the Pacific highway and San Francisco to Grants Pass, Ore, via Redwood highway.

Melville McKinstry, who has been appointed treasurer of the Pacific Transportation Securities, Inc., Pickwick Stages System, California Transit Co., Southern Pacific Motor Transportation Co., Union Auto Transportation Co., and the California Parlor Car Tours, Inc., was born on November 24, 1897, at Galt, California. He entered the service of the Southern Pacific on December 8, 1917, subsequently serving as secretary to the superintendent, assistant chief clerk to the superintendent and, for a short period, as yardman. Upon the organization of the Southern Pacific Motor Transport Company in May, 1927, Mr. McKinstry was appointed chief clerk to the vice-president and manager of that company. He served in that capacity until July, 1929, when the various motor coach companies on the Pacific Coast Consolidated and he was appointed treasurer of the Pacific Transportation Securities, Inc., and its various operating subsidiaries.

Among the Manufacturers

C. O. Carlson, of the export department of the White Company, Cleveland, O., has been appointed resident district manager in Central America.

The Russell Manufacturing Company has opened a new branch office at 1223 South Olive street, Los Angeles, Cal. **Kenneth L. Shaw** of the San Francisco office has been made manager of the new Los Angeles branch.

The AC Spark Plug Company, Flint, Mich., plans an expansion of its plant calling for the addition of 42,000 sq. ft. to the present floor space. The program embraces a new three-story building 100 ft. by 60 ft., which will be occupied by various AC divisions, including the engineering staffs, experimental, development and testing department and laboratories. The space now occupied by these departments will be utilized for the manufacturing of an electric gasoline gauge, a new AC product.

Robert W. Woodruff, president of the Coca Cola Company, has been appointed president of the **White Company,** succeeding Walter C. White, deceased. Mr. Woodruff has been a director of the White Company and a member of its executive committee for several years. Prior to his election as president of the Coca Cola Company, Mr. Woodruff was

Blank & Stoller

Robert W. Woodruff

Boston & Maine Transportation Company Trucks in Store-Door Service at Boston, Mass.

associated with the White Company, having served successively as salesman, manager of the Atlanta branch, vice-president of the Eastern region and vice-president and general manager in charge of sales. Mr. Woodruff was born at Columbus, Ga., on December 6, 1889. He was educated at Georgia Military Academy and Emory University. His first connection with the White Company dates back to 1911. He remained with that company until 1923, at which time he became associated with the Coca Cola Company. Mr. Woodruff will continue to act as president of the latter company.

The Brewer-Titchener Corporation, Cortland, N. Y., has awarded a contract to the Austin Company, of Cleveland, for the design and construction of three new units to its plant. The cost of the project will be approximately $225,000. The new buildings will be a 60-ft. by 80-ft. machine shop, a 70-ft. by 100-ft. forge shop and a 34-ft. by 72-ft. storage shed. All will be one-story buildings of steel, brick and concrete construction. The contract also calls for the installation of a five-ton traveling crane in the forge plant and a 12-ton crane in the storage shed.

Obituary

Walter C. White, president of the White Motors Company, Cleveland, O., died in that city on September 29, as a result of injuries received in an automobile accident. Mr. White was born on September 8, 1876, in Cleveland, Ohio. He attended the elementary schools of that city and in 1898 was graduated from Cornell University, later attending New York University Law School. For a short time Mr. White served in the legal department of the New York Central, then leaving the railroad field to become associated with his father, Thomas H. White, in the manufacture of the White steam car, since which time he has been active in the automotive industry. For about four years Mr. White was English representative of the White Co., in London. He returned to the United States in 1904 and in 1906 he was elected vice-president of the White Company. He succeeded his brother as president of the company in 1921. During the early stages of the automotive industry, Mr. White did much to promote the use of the automobile by participating in reliability tours, hill climbing and speed tests, whch were held by Henry Ford and other car manufacturers. He was also one of the first manufacturers to see the advantages of co-ordinated rail and motor transportation. In 1917 Mr. White went to France as chairman of the committee sent by the government to assist in organizing the repair and maintenance of motor vehicles in military transportation. He was president of the White Motors Company and the White Motors Securities Corp., and a member of the Society of Automotive Engineers.

Walter C. White

Trade Publications

THE ALAN WOOD STEEL COMPANY, Conshohocken, Penna., has recently issued a booklet describing its "AW" Diamondette floor plate, a slip-proof, long wearing and self draining covering for motor coach steps.

THE GURNEY BALL BEARING DIVISION of the Marlin-Rockwell Corp., Jamestown, N. Y., has recently issued a revised copy of the Ball Bearing Manual. This is a 202-page handbook containing information on how to select the correct type of bearing, how to determine the size and how to mount, house and lubricate all types of ball bearings.

MANLEY AIR COMPRESSORS.—A new catalog of Manley Air Compressors has just been issued by the Manley Manufacturing Company. It illustrates the complete line of Manley Air Compressors and contains information on choosing the proper type and size of an air compressor for garage and service station duty. The catalog may be obtained, without charge, by addressing a request to the Manley Manufacturing Company. Bridgeport, Conn.

View of Motor Coach Exhibit at the Recent Atlantic City Convention of the A. E. R. A.